

**Annual Administrative Code Supplement  
2002 Edition**

**DEPARTMENT OF COMMUNITY HEALTH  
OFFICE OF THE DIRECTOR  
DELAYED REGISTRATION OF BIRTHS**

**R 326.1**  
Source: 1997 AACS.

**R 326.2**  
Source: 1997 AACS.

**R 326.3**  
Source: 1997 AACS.

**R 326.4**  
Source: 1997 AACS.

**R 326.5**  
Source: 1997 AACS.

**DISTRICT AND COUNTY HEALTH DEPARTMENTS**

**PART 1. SERVICES**

**R 327.1**  
Source: 1997 AACS.

**R 327.2**  
Source: 1997 AACS.

**R 327.3**  
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**R 327.4**  
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**R 327.5**  
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**R 327.6**  
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**R 327.7**  
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**R 327.8**  
Source: 1997 AACS.

**R 327.9**  
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**R 327.10**  
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**PART 2. PERSONNEL CLASSIFICATION AND QUALIFICATIONS**

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**R 327.47**  
**Source:** 1997 AACS.

**DIRECTOR OF COMMUNITY HEALTH  
GENERAL RULES**

**R 330.20**  
**Source:** 1997 AACS.

**R 330.21**  
**Source:** 1997 AACS.

**R 330.30**  
**Source:** 1997 AACS.

**R 330.31**  
**Source:** 1997 AACS.

**R 330.32**  
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**R 330.33**  
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**R 330.34**  
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**R 330.35**  
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**R 330.36**  
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**R 330.37**  
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**R 330.40**  
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**R 330.41**  
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**R 330.42**  
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**R 330.43**  
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**R 330.44**  
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**R 330.45**  
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**R 330.46**  
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**R 330.47**  
Source: 1997 AACS.

**R 330.48**  
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**R 330.50**  
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**R 330.51**  
Source: 1997 AACS.

**R 330.52**  
Source: 1997 AACS.

**R 330.53**  
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**R 330.54**  
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**R 330.55**  
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**R 330.56**  
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**R 330.60**  
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**R 330.61**  
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**R 330.62**  
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**R 330.63**  
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**R 330.64**  
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**R 330.70**  
Source: 1997 AACS.

**R 330.80**  
Source: 1997 AACS.

**R 330.81**  
Source: 1997 AACS.

**R 330.82**  
Source: 1997 AACS.

**R 330.83**  
Source: 1997 AACS.

**R 330.84**  
Source: 1997 AACS.

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**R 330.90**  
Source: 1997 AACS.

**R 330.91**  
Source: 1997 AACS.

**R 330.92**  
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**R 330.93**  
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**R 330.94**  
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**R 330.95**  
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**R 330.96**  
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**R 330.97**  
Source: 1997 AACS.

**R 330.98**  
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**R 330.99**  
Source: 1997 AACS.

**R 330.100**  
Source: 1997 AACS.

**R 330.101**  
Source: 1997 AACS.

**R 330.102**  
Source: 1997 AACS.

**R 330.103**  
Source: 1997 AACS.

**R 330.104**  
Source: 1997 AACS.

**R 330.105**  
Source: 1997 AACS.

**R 330.106**  
Source: 1997 AACS.

**R 330.107**  
Source: 1997 AACS.

**R 330.108**  
Source: 1997 AACS.

**R 330.109**  
Source: 1997 AACS.

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**R 330.111**  
Source: 1997 AACS.

**R 330.112**  
Source: 1997 AACS.

**R 330.113**  
Source: 1997 AACS.

**R 330.114**  
Source: 1997 AACS.

**R 330.115**  
Source: 1997 AACS.

**R 330.116**  
Source: 1997 AACS.

**R 330.117**  
Source: 1997 AACS.

**HEALTH LEGISLATION AND POLICY DEVELOPMENT  
GENERAL RULES**

**PART 1. DEPARTMENT OF MENTAL HEALTH**

**SUBPART 1. GENERAL PROVISIONS**

**R 330.1001**  
Source: 1998-2000 AACS.

**R 330.1005**  
Source: 1983 AACS.

**R 330.1010**  
Source: 1997 AACS.

**R 330.1017**  
Source: 1981 AACS.

**R 330.1019**  
Source: 1983 AACS.

**SUBPART 2. COMMUNITY MENTAL HEALTH CENTERS**

**R 330.1025**  
Source: 1981 AACS.

**SUBPART 3. MENTAL RETARDATION FACILITIES**

**R 330.1075**  
Source: 1997 AACS.

**SUBPART 4. LICENSING AND REGULATION OF MENTAL HEALTH HOSPITALS, PSYCHIATRIC  
FACILITIES, AND PSYCHIATRIC UNITS**

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**R 330.1201**  
Source: 1988 AACS.

**R 330.1210**  
Source: 1984 AACS.

**R 330.1214**  
Source: 1990 AACS.

**R 330.1239**  
Source: 1990 AACS.

**R 330.1243**  
Source: 1990 AACS.

**R 330.1255**  
Source: 1986 AACS.

**R 330.1265**  
Source: 1981 AACS.

**R 330.1269**  
Source: 1983 AACS.

**R 330.1275**  
Source: 1990 AACS.

**R 330.1276**  
Source: 1988 AACS.

**R 330.1281**  
Source: 1986 AACS.

**R 330.1285**  
Source: 1986 AACS.

**R 330.1287**  
Source: 1986 AACS.

**R 330.1289**  
Source: 1986 AACS.

**R 330.1291**  
Source: 1986 AACS.

**SUBPART 5. FOSTER CARE CONTRACT REVOCATION**

**R 330.1401**  
Source: 1997 AACS.

**SUBPART 6. FAMILY SUPPORT SUBSIDY PROGRAM**

**R 330.1601**  
Source: 1984 AACS.

**R 330.1606**  
Source: 1984 AACS.

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**R 330.1607**  
Source: 1990 AACS.

**R 330.1611**  
Source: 1984 AACS.

**R 330.1613**  
Source: 1984 AACS.

**R 330.1616**  
Source: 1984 AACS.

**R 330.1621**  
Source: 1990 AACS.

**R 330.1626**  
Source: 1990 AACS.

**R 330.1631**  
Source: 1984 AACS.

**R 330.1636**  
Source: 1984 AACS.

**R 330.1641**  
Source: 1984 AACS.

**R 330.1643**  
Source: 1984 AACS.

**R 330.1646**  
Source: 1984 AACS.

**R 330.1651**  
Source: 1984 AACS.

**R 330.1656**  
Source: 1990 AACS.

**SUBPART 7. PLACEMENT OF ADULTS WHO HAVE A MENTAL ILLNESS OR A DEVELOPMENTAL  
DISABILITY INTO COMMUNITY-BASED DEPENDENT LIVING SETTINGS**

**R 330.1701**  
Source: 1996 AACS.

**R 330.1702**  
Source: 1996 AACS.

**R 330.1703**  
Source: 1996 AACS.

**R 330.1704**  
Source: 1996 AACS.

**SUBPART 8. CERTIFICATION OF SPECIALIZED PROGRAMS OFFERED IN ADULT FOSTER CARE HOME  
TO CLIENTS WITH MENTAL ILLNESS OR DEVELOPMENTAL DISABILITY**

**R 330.1801**

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**Source:** 1996 AACS.

**R 330.1802**

**Source:** 1996 AACS.

**R 330.1803**

**Source:** 1996 AACS.

**R 330.1804**

**Source:** 1996 AACS.

**R 330.1805**

**Source:** 1996 AACS.

**R 330.1806**

**Source:** 1996 AACS.

**R 330.1807**

**Source:** 1996 AACS.

**R 330.1808**

**Source:** 1996 AACS.

**R 330.1809**

**Source:** 1996 AACS.

**PART 2. COUNTY COMMUNITY MENTAL HEALTH SERVICES PROGRAMS**

**SUBPART 1. COMMUNITY MENTAL HEALTH SERVICES**

**R 330.2005**

**Source:** 1986 AACS.

**R 330.2006**

**Source:** 1983 AACS.

**R 330.2007**

**Source:** 1986 AACS.

**R 330.2012**

**Source:** 1981 AACS.

**R 330.2013**

**Source:** 1984 AACS.

**R 330.2014**

**Source:** 1986 AACS.

**R 330.2022**

**Source:** 1986 AACS.

**SUBPART 2. COMMUNITY MENTAL HEALTH BOARD REPORTS**

**R 330.2038**

**Source:** 1986 AACS.

**R 330.2039**

**Source:** 1986 AACS.



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**SUBPART 4. COMMUNITY MENTAL HEALTH BOARD**

**R 330.2067**  
Source: 1986 AACS.

**R 330.2071**  
Source: 1986 AACS.

**SUBPART 5. COMMUNITY MENTAL HEALTH DIRECTOR**

**R 330.2081**  
Source: 1990 AACS.

**SUBPART 6. CHILDREN'S DIAGNOSTIC AND TREATMENT SERVICE**

**R 330.2105**  
Source: 1990 AACS.

**R 330.2110**  
Source: 1990 AACS.

**R 330.2115**  
Source: 1990 AACS.

**R 330.2120**  
Source: 1990 AACS.

**R 330.2125**  
Source: 1990 AACS.

**R 330.2130**  
Source: 1990 AACS.

**R 330.2135**  
Source: 1997 AACS.

**SUBPART 7. CERTIFICATION PROCESS**

**R 330.2701**  
Source: 1997 AACS.

**R 330.2702**  
Source: 1997 AACS.

**R 330.2703**  
Source: 1997 AACS.

**SUBPART 8. CERTIFICATION STANDARDS**

**R 330.2801**  
Source: 1997 AACS.

**R 330.2802**  
Source: 1997 AACS.

**R 330.2803**  
Source: 1997 AACS.

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**R 330.2804**  
Source: 1997 AACS.

**R 330.2805**  
Source: 1997 AACS.

**R 330.2806**  
Source: 1997 AACS.

**R 330.2807**  
Source: 1997 AACS.

**R 330.2808**  
Source: 1997 AACS.

**R 330.2809**  
Source: 1997 AACS.

**R 330.2810**  
Source: 1997 AACS.

**R 330.2811**  
Source: 1997 AACS.

**R 330.2812**  
Source: 1997 AACS.

**R 330.2813**  
Source: 1997 AACS.

**R 330.2814**  
Source: 1997 AACS.

**PART 3. STATE AND COUNTY FINANCIAL RESPONSIBILITY**

**R 330.3010**  
Source: 1997 AACS.

**R 330.3017**  
Source: 1986 AACS.

**PART 4. ADMINISTRATIVE ACTION FOR MENTALLY ILL PERSONS REQUIRING TREATMENT AND  
THOSE DEEMED CLINICALLY SUITABLE FOR HOSPITALIZATION**

**SUBPART 1. DESIGNATED HOSPITALS**

**R 330.4005**  
Source: 1997 AACS.

**R 330.4008**  
Source: 1997 AACS.

**SUBPART 2. TRANSFER REQUIREMENTS**

**R 330.4011**  
Source: 1986 AACS.

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**R 330.4013**  
Source: 1986 AACS.

**R 330.4015**  
Source: 1997 AACS.

**SUBPART 3. ADMISSION CONDITIONS**

**R 330.4025**  
Source: 1997 AACS.

**R 330.4028**  
Source: 1997 AACS.

**R 330.4033**  
Source: 1997 AACS.

**R 330.4035**  
Source: 1997 AACS.

**R 330.4039**  
Source: 1981 AACS.

**R 330.4043**  
Source: 1997 AACS.

**R 330.4045**  
Source: 1986 AACS.

**R 330.4047**  
Source: 1986 AACS.

**R 330.4049**  
Source: 1986 AACS.

**R 330.4059**  
Source: 1997 AACS.

**SUBPART 4. PERIODIC REVIEW**

**R 330.4065**  
Source: 1997 AACS.

**R 330.4067**  
Source: 1997 AACS.

**SUBPART 5. RELEASE AND DISCHARGE**

**R 330.4075**  
Source: 1997 AACS.

**R 330.4077**  
Source: 1990 AACS.

**R 330.4081**  
Source: 1997 AACS.

**R 330.4083**

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**Source:** 1990 AACS.

**R 330.4086**

**Source:** 1997 AACS.

**R 330.4091**

**Source:** 1997 AACS.

**R 330.4093**

**Source:** 1997 AACS.

**R 330.4095**

**Source:** 1997 AACS.

**PART 4A. CIVIL ADMISSION AND DISCHARGE PROCEDURES FOR EMOTIONALLY DISTURBED MINORS**

**SUBPART 1. GENERAL PROVISIONS**

**R 330.4501**

**Source:** 1990 AACS.

**R 330.4510**

**Source:** 1997 AACS.

**R 330.4512**

**Source:** 1997 AACS.

**R 330.4515**

**Source:** 1997 AACS.

**SUBPART 2. ADMISSIONS**

**R 330.4601**

**Source:** 1997 AACS.

**R 330.4603**

**Source:** 1990 AACS.

**R 330.4606**

**Source:** 1997 AACS.

**R 330.4611**

**Source:** 1990 AACS.

**SUBPART 3. PERIODIC REVIEW**

**R 330.4616**

**Source:** 1997 AACS.

**SUBPART 4. CHANGE IN STATUS OF HOSPITALIZATION**

**R 330.4620**

**Source:** 1990 AACS.

**R 330.4621**

**Source:** 1997 AACS.

**R 330.4626**

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**Source:** 1990 AACs.

**R 330.4631**

**Source:** 1990 AACs.

**R 330.4636**

**Source:** 1990 AACs.

**R 330.4641**

**Source:** 1990 AACs.

**R 330.4646**

**Source:** 1990 AACs.

**SUBPART 5. OBJECTION TO HOSPITALIZATION PROCESS**

**R 330.4651**

**Source:** 1990 AACs.

**R 330.4656**

**Source:** 1990 AACs.

**R 330.4661**

**Source:** 1990 AACs.

**PART 5. ADMINISTRATIVE ACTION FOR DEVELOPMENTALLY DISABLED PERSONS REQUIRING CARE  
AND TREATMENT**

**SUBPART 1. DESIGNATED RESIDENTIAL FACILITIES**

**R 330.5005**

**Source:** 1986 AACs.

**R 330.5008**

**Source:** 1997 AACs.

**SUBPART 2. TRANSFER REQUIREMENTS**

**R 330.5011**

**Source:** 1997 AACs.

**R 330.5013**

**Source:** 1997 AACs.

**SUBPART 3. ADMISSION CONDITIONS**

**R 330.5025**

**Source:** 1997 AACs.

**R 330.5028**

**Source:** 1997 AACs.

**R 330.5031**

**Source:** 1981 AACs.

**R 330.5033**

**Source:** 1983 AACs.

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**R 330.5045**  
Source: 1997 AACS.

**SUBPART 4. PERIODIC REVIEW**

**R 330.5065**  
Source: 1997 AACS.

**SUBPART 5. RELEASE AND DISCHARGE**

**R 330.5075**  
Source: 1997 AACS.

**R 330.5081**  
Source: 1997 AACS.

**R 330.5083**  
Source: 1997 AACS.

**R 330.5086**  
Source: 1981 AACS.

**R 330.5093**  
Source: 1997 AACS.

**R 330.5095**  
Source: 1997 AACS.

**PART 6. GUARDIANSHIP FOR RECIPIENTS OF MENTAL  
HEALTH SERVICES**

**R 330.6013**  
Source: 1981 AACS.

**R 330.6031**  
Source: 1986 AACS.

**PART 7. RIGHTS OF RECIPIENTS OF MENTAL HEALTH SERVICES**

**SUBPART 1. GENERAL PROVISIONS**

**R 330.7001**  
Source: 1998-2000 AACS.

**R 330.7002**  
Source: 1998-2000 AACS.

**R 330.7003**  
Source: 1998-2000 AACS.

**R 330.7005**  
Source: 1998-2000 AACS.

**SUBPART 2. RIGHTS OF RECIPIENTS OF MENTAL HEALTH SERVICES**

**R 330.7009**

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**R 330.7011**

**Source:** 1998-2000 AACs.

**R 330.7012**

**Source:** 1998-2000 AACs.

**R 330.7014**

**Source:** 1998-2000 AACs.

**R 330.7017**

**Source:** 1998-2000 AACs.

**R 330.7029**

**Source:** 1998-2000 AACs.

**R 330.7032**

**Source:** 1998-2000 AACs.

**R 330.7035**

**Source:** 1998-2000 AACs.

**R 330.7037**

**Source:** 1998-2000 AACs.

**R 330.7045**

**Source:** 1998-2000 AACs.

**R 330.7046**

**Source:** 1998-2000 AACs.

**R 330.7051**

**Source:** 1998-2000 AACs.

**SUBPART 3. ADDITIONAL RIGHTS OF RESIDENTS OF FACILITIES**

**R 330.7125**

**Source:** 1998-2000 AACs.

**R 330.7131**

**Source:** 1997 AACs.

**R 330.7135**

**Source:** 1998-2000 AACs.

**R 330.7139**

**Source:** 1998-2000 AACs.

**R 330.7142**

**Source:** 1998-2000 AACs.

**R 330.7145**

**Source:** 1998-2000 AACs.

**R 330.7151**

**Source:** 1998-2000 AACs.

**R 330.7158**

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**Source:** 1998-2000 AACS.

**R 330.7161**

**Source:** 1998-2000 AACS.

**R 330.7165**

**Source:** 1998-2000 AACS.

**R 330.7171**

**Source:** 1981 AACS.

**R 330.7175**

**Source:** 1998-2000 AACS.

**R 330.7181**

**Source:** 1998-2000 AACS.

**R 330.7185**

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**R 330.7188**

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**R 330.7189**

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**R 330.7191**

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**R 330.7195**

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**R 330.7199**

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**R 330.7205**

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**R 330.7221**

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**R 330.7227**

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**R 330.7229**

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**R 330.7231**

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**R 330.7235**

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**R 330.7239**

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**R 330.7243**

**Source:** 1998-2000 AACS.



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**R 330.7251**  
Source: 1998-2000 AACS.

**R 330.7253**  
Source: 1998-2000 AACS.

**R 330.7254**  
Source: 1998-2000 AACS.

**R 330.7260**  
Source: 1981 AACS.

**PART 8. FINANCIAL LIABILITY FOR MENTAL HEALTH SERVICES**

**R 330.8005**  
Source: 1997 AACS.

**R 330.8008**  
Source: 1997 AACS.

**R 330.8012**  
Source: 1997 AACS.

**R 330.8024**  
Source: 1981 AACS.

**SUBPART 2. COMMUNITY MENTAL HEALTH**

**R 330.8201**  
Source: 1997 AACS.

**R 330.8204**  
Source: 1997 AACS.

**R 330.8205**  
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**R 330.8206**  
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**R 330.8207**  
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**R 330.8208**  
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**R 330.8209**  
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**R 330.8210**  
Source: 1997 AACS.

**R 330.8214**  
Source: 1997 AACS.

**R 330.8215**  
Source: 1997 AACS.

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**R 330.8217**  
Source: 1997 AACS.

**R 330.8220**  
Source: 1997 AACS.

**R 330.8224**  
Source: 1997 AACS.

**R 330.8227**  
Source: 1997 AACS.

**R 330.8229**  
Source: 1997 AACS.

**R 330.8230**  
Source: 1997 AACS.

**R 330.8234**  
Source: 1997 AACS.

**R 330.8237**  
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**R 330.8238**  
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**R 330.8239**  
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**R 330.8240**  
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**R 330.8241**  
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**R 330.8242**  
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**R 330.8244**  
Source: 1997 AACS.

**R 330.8250**  
Source: 1997 AACS.

**R 330.8251**  
Source: 1997 AACS.

**R 330.8254**  
Source: 1997 AACS.

**R 330.8256**  
Source: 1997 AACS.

**R 330.8257**  
Source: 1997 AACS.

**R 330.8264**  
Source: 1997 AACS.

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**R 330.8267**  
Source: 1997 AACS.

**R 330.8270**  
Source: 1997 AACS.

**R 330.8273**  
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**R 330.8275**  
Source: 1997 AACS.

**R 330.8277**  
Source: 1997 AACS.

**R 330.8279**  
Source: 1997 AACS.

**R 330.8280**  
Source: 1997 AACS.

**R 330.8284**  
Source: 1997 AACS.

**PART 9. MISCELLANEOUS PROVISIONS**

**SUBPART 1. LAFAYETTE CLINIC**

**R 330.9001**  
Source: 1997 AACS.

**R 330.9005**  
Source: 1997 AACS.

**R 330.9007**  
Source: 1997 AACS.

**R 330.9009**  
Source: 1997 AACS.

**R 330.9011**  
Source: 1997 AACS.

**SUBPART 2. NEURO-PSYCHIATRIC INSTITUTE**

**R 330.9121**  
Source: 1997 AACS.

**R 330.9123**  
Source: 1997 AACS.

**R 330.9125**  
Source: 1997 AACS.

**SUBPART 3. ADMINISTRATIVE PROCEDURE**

**R 330.9201**  
Source: 1997 AACS.

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**R 330.9205**  
Source: 1997 AACS.

**R 330.9208**  
Source: 1997 AACS.

**R 330.9210**  
Source: 1997 AACS.

**R 330.9215**  
Source: 1997 AACS.

**R 330.9220**  
Source: 1997 AACS.

**R 330.9222**  
Source: 1997 AACS.

**R 330.9225**  
Source: 1997 AACS.

**SUBPART 4. IMPACT STATEMENTS**

**R 330.9301**  
Source: 1986 AACS.

**R 330.9306**  
Source: 1986 AACS.

**SUBPART 5. CONDUCT ON DEPARTMENT PROPERTY**

**R 330.9401**  
Source: 1988 AACS.

**R 330.9406**  
Source: 1988 AACS.

**R 330.9411**  
Source: 1988 AACS.

**R 330.9416**  
Source: 1988 AACS.

**R 330.9421**  
Source: 1988 AACS.

**R 330.9426**  
Source: 1988 AACS.

**R 330.9431**  
Source: 1988 AACS.

**PART 10. CRIMINAL PROVISIONS**

**SUBPART 1. TRANSFER OF PRISONERS**

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**R 330.10001**  
Source: 1997 AACS.

**R 330.10002**  
Source: 1997 AACS.

**R 330.10003**  
Source: 1997 AACS.

**R 330.10004**  
Source: 1997 AACS.

**R 330.10005**  
Source: 1997 AACS.

**R 330.10006**  
Source: 1997 AACS.

**R 330.10006a**  
Source: 1997 AACS.

**R 330.10007**  
Source: 1997 AACS.

**R 330.10008**  
Source: 1981 AACS.

**R 330.10009**  
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**R 330.10010**  
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**R 330.10012**  
Source: 1997 AACS.

**R 330.10013**  
Source: 1981 AACS.

**R 330.10014**  
Source: 1981 AACS.

**R 330.10015**  
Source: 1997 AACS.

**R 330.10016**  
Source: 1997 AACS.

**R 330.10017**  
Source: 1997 AACS.

**R 330.10018**  
Source: 1997 AACS.

**R 330.10019**  
Source: 1997 AACS.

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**R 330.10020**  
Source: 1997 AACS.

**R 330.10021**  
Source: 1997 AACS.

**R 330.10022**  
Source: 1997 AACS.

**R 330.10023**  
Source: 1997 AACS.

**R 330.10024**  
Source: 1997 AACS.

**R 330.10025**  
Source: 1997 AACS.

**R 330.10026**  
Source: 1997 AACS.

**R 330.10027**  
Source: 1997 AACS.

**R 330.10028**  
Source: 1997 AACS.

**R 330.10029**  
Source: 1997 AACS.

**SUBPART 2. FORENSIC EXAMINATIONS**

**R 330.10055**  
Source: 1988 AACS.

**R 330.10056**  
Source: 1988 AACS.

**R 330.10057**  
Source: 1988 AACS.

**R 330.10058**  
Source: 1988 AACS.

**R 330.10059**  
Source: 1988 AACS.

**DEPARTMENT OF COMMUNITY HEALTH**

**HEALTH LEGISLATION AND POLICY DEVELOPMENT**

**GENERAL RULES**

**PART 11. ENFORCEMENT SYSTEM FOR LONG-TERM CARE FACILITIES**

**R 330.11001**  
Source: 1998-2000 AACS.

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**R 330.11002**  
Source: 1998-2000 AACS.

**R 330.11003**  
Source: 1998-2000 AACS.

**R 330.11004**  
Source: 1998-2000 AACS.

**R 330.11005**  
Source: 1998-2000 AACS.

**R 330.11006**  
Source: 1998-2000 AACS.

**R 330.11007**  
Source: 1998-2000 AACS.

**R 330.11008**  
Source: 1998-2000 AACS.

**R 330.11009**  
Source: 1998-2000 AACS.

**R 330.11010**  
Source: 1998-2000 AACS.

**R 330.11011**  
Source: 1998-2000 AACS.

**R 330.11012**  
Source: 1998-2000 AACS.

**R 330.11013**  
Source: 1998-2000 AACS.

**R 330.11014**  
Source: 1998-2000 AACS.

**R 330.11015**  
Source: 1998-2000 AACS.

**R 330.11016**  
Source: 1998-2000 AACS.

**R 330.11017**  
Source: 1998-2000 AACS.

**DEPARTMENT OF TREASURY  
STATE HOSPITAL FINANCE AUTHORITY  
GENERAL RULES**

**R 331.1**  
Source: 1997 AACS.

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**R 331.2**  
Source: 1997 AACS.

**R 331.3**  
Source: 1997 AACS.

**R 331.4**  
Source: 1997 AACS.

**R 331.5**  
Source: 1997 AACS.

**R 331.6**  
Source: 1997 AACS.

**R 331.7**  
Source: 1997 AACS.

**R 331.8**  
Source: 1997 AACS.

**R 331.9**  
Source: 1997 AACS.

**R 331.10**  
Source: 1997 AACS.

**R 331.11**  
Source: 1997 AACS.

**R 331.12**  
Source: 1997 AACS.

**R 331.13**  
Source: 1997 AACS.

**DEPARTMENT OF ENVIRONMENTAL QUALITY  
AIR QUALITY DIVISION  
GENERAL RULES**

**PART 1. DEFINITIONS**

**R 336.11**  
Source: 1997 AACS.

**R 336.12**  
Source: 1997 AACS.

**R 336.13**  
Source: 1997 AACS.

**R 336.14**  
Source: 1997 AACS.

**PART 2. AIR USE APPROVAL**



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**R 336.21**  
Source: 1997 AACS.

**R 336.26**  
Source: 1997 AACS.

**R 336.28**  
Source: 1997 AACS.

**R 336.29**  
Source: 1997 AACS.

**R 336.30**  
Source: 1997 AACS.

**R 336.31**  
Source: 1997 AACS.

**R 336.32**  
Source: 1997 AACS.

**R 336.33**  
Source: 1997 AACS.

**R 336.34**  
Source: 1997 AACS.

**R 336.35**  
Source: 1997 AACS.

**R 336.36**  
Source: 1997 AACS.

**PART 3. EMISSION LIMITATIONS AND PROHIBITIONS**

**R 336.41—R 336.49**  
Source: 1997 AACS.

**R 336.42**  
Source: 1997 AACS.

**R 336.43**  
Source: 1997 AACS.

**R 336.44**  
Source: 1997 AACS.

**R 336.45**  
Source: 1997 AACS.

**R 336.46**  
Source: 1997 AACS.

**R 336.47**  
Source: 1997 AACS.

**R 336.48**  
Source: 1997 AACS.

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**R 336.49**  
Source: 1997 AACS.

**PART 4. TESTING AND SAMPLING**

**R 336.51**  
Source: 1997 AACS.

**R 336.52**  
Source: 1997 AACS.

**R 336.53**  
Source: 1997 AACS.

**R 336.54**  
Source: 1997 AACS.

**PART 5. AIR CLEANING DEVICES AND COLLECTED CONTAMINANTS**

**R 336.61**  
Source: 1997 AACS.

**R 336.62**  
Source: 1997 AACS.

**PART 6. AIR POLLUTION EPISODES**

**R 336.71**  
Source: 1997 AACS.

**R 336.72**  
Source: 1997 AACS.

**R 336.73**  
Source: 1997 AACS.

**R 336.74**  
Source: 1997 AACS.

**R 336.75**  
Source: 1997 AACS.

**R 336.76**  
Source: 1997 AACS.

**R 336.77**  
Source: 1997 AACS.

**R 336.78**  
Source: 1997 AACS.

**R 336.79**  
Source: 1997 AACS.

**PART 7. ANNUAL REPORTING AND SURVEILLANCE FEES**

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**R 336.81**  
Source: 1997 AACS.

**R 336.82**  
Source: 1997 AACS.

**R 336.83**  
Source: 1997 AACS.

**PART 8. SUSPENSION OF ENFORCEMENT**

**R 336.91**  
Source: 1997 AACS.

**R 336.92**  
Source: 1997 AACS.

**R 336.93**  
Source: 1997 AACS.

**R 336.94**  
Source: 1997 AACS.

**R 336.95**  
Source: 1997 AACS.

**R 336.96**  
Source: 1997 AACS.

**R 336.97**  
Source: 1997 AACS.

**PART 10. ORGANIZATION, OPERATIONS, AND PROCEDURES**

**R 336.101**  
Source: 1997 AACS.

**R 336.102**  
Source: 1997 AACS.

**R 336.103**  
Source: 1997 AACS.

**R 336.104**  
Source: 1997 AACS.

**R 336.105**  
Source: 1997 AACS.

**R 336.106**  
Source: 1997 AACS.

**R 336.107**  
Source: 1997 AACS.

**R 336.108**  
Source: 1997 AACS.

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**PART 11. HEARINGS**

**R 336.111**  
Source: 1997 AACS.

**R 336.112**  
Source: 1997 AACS.

**R 336.113**  
Source: 1997 AACS.

**R 336.114**  
Source: 1997 AACS.

**R 336.115**  
Source: 1997 AACS.

**R 336.116**  
Source: 1997 AACS.

**PART 14. EXTENSION OF COMPLIANCE DATE PAST JANUARY 1, 1980**

**R 336.141**  
Source: 1997 AACS.

**R 336.142**  
Source: 1997 AACS.

**R 336.143**  
Source: 1997 AACS.

**R 336.144**  
Source: 1997 AACS.

**R 336.145**  
Source: 1997 AACS.

**R 336.146**  
Source: 1997 AACS.

**R 336.147**  
Source: 1997 AACS.

**AIR QUALITY DIVISION  
ANNUAL REPORTING**

**R 336.201**  
Source: 1980 AACS.

**R 336.202**  
Source: 1986 AACS.

**R 336.203**  
Source: 1997 AACS.

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**R 336.204**  
Source: 1987 AACS.

**R 336.205**  
Source: 1980 AACS.

**DEPARTMENT OF ENVIROMENTAL QUALITY**

**AIR QUALITY DIVISION**

**DISBURSEMENT OF AIR POLLUTION SURVEILLANCE FEES TO LOCAL UNITS**

**R 336.501**  
Source: 1998-2000 AACS.

**R 336.502**  
Source: 1998-2000 AACS.

**R 336.503**  
Source: 1998-2000 AACS.

**R 336.504**  
Source: 1998-2000 AACS.

**R 336.505**  
Source: 1998-2000 AACS.

**R 336.506**  
Source: 1998-2000 AACS.

**R 336.507**  
Source: 1998-2000 AACS.

**R 336.508**  
Source: 1998-2000 AACS.

**MOTOR VEHICLE EMISSIONS INSPECTION/MAINTENANCE PROGRAM**

**R 336.601**  
Source: 1997 AACS.

**R 336.602**  
Source: 1997 AACS.

**R 336.603**  
Source: 1997 AACS.

**AIR POLLUTION CONTROL**

**PART 1. GENERAL PROVISIONS**

**R 336.1101.**  
Source: 1998-2000 AACS.

**R 336.1102 Definitions; B.**  
Rule 102. As used in these rules:

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(a) "Best available control technology for toxics" or "T-BACT" means the maximum degree of emission reduction which the department determines is reasonably achievable for each process that emits toxic air contaminants, taking into account energy, environmental, and economic impacts and other costs.

(b) "Best available information" means data which serves as the basis for a risk assessment. Such information may be taken from the scientific literature or the integrated risk information system database maintained by the United States environmental protection agency or from other databases, as appropriate. The term includes other pertinent studies or reports containing data which the department finds to be of adequate quality for use in the risk assessment.

(c) "Black coating" means a coating which meets both of the following criteria:

(i) Maximum lightness: 23 units.

(ii) Saturation: less than 2.8, where saturation equals the square root of  $A^2 + B^2$ .

These criteria are based on Cielab color space, 0/45 geometry. For spherical geometry, specular included, maximum lightness is 33 units.

(d) "Blending tank," as it pertains to R 336.1631, means any vessel in which organic resin and solvent or other materials are added to produce a product blend.

(e) "Breakthrough," with respect to a carbon adsorption system, means a condition in which the carbon bed is saturated with a volatile organic compound to the extent that the control efficiency of the system is substantially reduced.

(f) "Business machine" means a device that uses electronic or mechanical methods to process information, perform calculations, print or copy information or convert sound into electrical impulses for transmission, including devices listed in standard industrial classification numbers 3572, 3573, 3574, 3579, and 3661 and photocopy machines, a subcategory of standard industrial classification number 3861.

History: 1979 ACS 7, Eff. Aug. 22, 1981; 1989 MR 4, Eff. Apr. 19, 1989; 1992 MR 4, Eff. Apr. 17, 1992; 2002 MR 10, Eff. May 28, 2002.

**R 336.1103**

**Source:** 1995 AACs.

**R 336.1104 Definitions; D.**

Rule 104. As used in these rules:

(a) "Dampened-off coke oven" means a coke oven that is isolated from the coke oven gas collector main by closing every damper valve on all standpipes of that oven during the decarbonization period.

(b) "Decarbonization period," with respect to coke ovens, means the time for combusting carbon formed at the oven roof and in the standpipe assembly. The decarbonization period commences when a charging-hole lid or lids or a standpipe lid or lids are removed or opened near the end of the coking cycle and ends with the initiation of the next charging period.

(c) "Delivery vessel" means any tank truck, tank-equipped trailer, railroad tank car, or any similar vessel equipped with a storage tank used for the transport of a volatile organic compound from sources of supply to any stationary vessel.

(d) "Demolition waste material" means waste building materials that result from demolition operations on houses and commercial and industrial buildings.

(e) "Department" means the director of the department of environmental quality or his or her designee.

(f) "Difficult-to-monitor component" means a component that can only be monitored by elevating the monitoring personnel more than 6 feet above a support surface.

(g) "Dry organic resin" means the organic resin solids from which all liquids have been removed, as deliverable for sale or use.

(h) "Dispensing facility" means a location where gasoline is transferred to a motor vehicle tank from a stationary vessel.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1989 MR 4, Eff. Apr. 19, 1989; 1993 MR 11, Eff. Nov. 18, 1993; 2000 MR 4, Eff. Apr. 10, 2000; 2002 MR 10, Eff. May 28, 2002.

**R 336.1105 Definitions; E.**

Rule 105. As used in these rules:

(a) "Electrostatic prep coat" means a coating that is applied to a plastic part solely to provide conductivity for the subsequent application of a prime, a topcoat, or other coating through the use of electrostatic application methods. An electrostatic prep coat is clearly identified as an electrostatic prep coat on its accompanying material safety data sheet.

(b) "Emission unit" means any part of a stationary source that emits or has the potential to emit an air contaminant. Examples of emission units include the following:

(i) A fossil fuel-fired, steam-generating unit.

(ii) A topcoat painting line.

(iii) A solid waste incinerator.

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- (iv) A clinker cooler at a portland cement plant.
  - (v) A process unit at a chemical plant.
  - (c) "Equipment utilized in the manufacturing of pharmaceutical products" means equipment associated with the storage, transfer, or manufacturing of pharmaceutical products, including raw materials and intermediate products, by chemical synthesis. This definition does not include equipment associated with the manufacturing of pharmaceutical products by fermentation or extraction, the formulation or packaging of bulk pharmaceuticals, or the processing of waste resulting from pharmaceutical synthesis.
  - (d) "Equivalent method," with respect to source sampling, means a method or set of procedures for obtaining source samples that has been demonstrated to the department's satisfaction to have a consistent and quantitatively known relationship to an applicable reference test method.
  - (e) "Excess air" means any air in excess of the amount of air required for complete combustion of a material as determined by using reference test method 3 of appendix A to the department's rules.
  - (f) "Excess emissions" means emissions of an air contaminant in excess of any applicable emission limitation.
  - (g) "External floating roof stationary vessel" means an open top stationary vessel equipped with a cover or roof which rests upon and is supported by the liquid being contained and which has a closure seal or seals to reduce the space between the cover or roof edge and the vessel wall.
  - (h) "Extreme environmental conditions" means any of the following:
    - (i) Outdoor weather.
    - (ii) Temperatures consistently above 95 degrees Celsius (203 degrees Fahrenheit).
    - (iii) Detergents.
    - (iv) Abrasive and scouring agents.
    - (v) Solvents.
    - (vi) Corrosive atmospheres.
    - (vii) Other similar harsh conditions.
  - (i) "Extreme performance coating" means a coating which is designed to protect a coated part from extreme environmental conditions and which is applied to a part that, in its use as a finished product, is intended to be subjected to extreme environmental conditions.
- History: 1979 ACS 1, Eff. Jan. 19, 1980; 1979 ACS 7, Eff. Aug. 22, 1981; 1989 MR 4, Eff. Apr. 19, 1989; 1993 MR 4, Eff. Apr. 28, 1993; 1993 MR 11, Eff. Nov. 18, 1993; 1994 MR 2, Eff. Mar. 31, 1994; 2002 MR 10, Eff. May 28, 2002.

**R 336.1106**

**Source:** 1992 AACS.

**R 336.1107 Definitions; G.**

Rule 107. As used in these rules:

- (a) "Gasoline" means any petroleum distillate which has a Reid vapor pressure equal to or greater than 4.0 psia and which is used for automotive fuel.
- (b) "Geographical site" means contiguous land ownership by 1 landowner. A public right of way, such as a road, railroad, and watercourse, through part of the site, is not considered to break the continuity. Where transmission and fuel delivery rights-of-way or a strip of land that serves no other purpose than as a transportation or materials handling link connects 2 or more otherwise separate geographical sites, the connected sites shall be considered separate geographical sites.
- (c) "Good engineering practice design" means, with respect to stack heights, the height necessary to ensure that emissions from the stack result in acceptable concentrations of air contaminants in the immediate vicinity of the stationary source as a result of atmospheric downwash, eddies, and wakes which may be created by the stationary source itself, nearby structures, or nearby terrain obstacles and shall not exceed the greatest of the following limits:
  - (i) Two hundred and thirteen feet (65 meters).
  - (ii) Two and one-half times the height of the structure or nearby structure for those stacks for which construction or modification commenced on or before January 12, 1979, if the owner or operator produces evidence that this relationship was actually relied upon in designing the stack to ensure protection against downwash.
  - (iii) The sum of the height of the structure or nearby structure plus 1.5 times the lesser of the height or width of the structure or nearby structure for those stacks for which construction or modification commenced after January 12, 1979.
- (iv) Such height as an owner or operator of a stationary source demonstrates, to the satisfaction of the department, is necessary through the use of field studies or fluid models after notice and opportunity for public hearing.
- (d) "Gloss reducer" means a coating that is applied to a plastic part solely to reduce the shine of the part. A gloss reducer shall not be applied at a thickness of more than 0.5 mils of coating solids.
- (e) "Graphic arts line" means an operation or series of operations in which printing (the formation of words), designs, or

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pictures on a substrate by means of partial coverage of the substrate are employed. A graphic arts line may also employ 1 or more coating operations in which a uniform layer of coating is applied either across the entire width of the substrate or across only certain portions of the substrate.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1979 ACS 7, Eff. Aug. 22, 1981; 1989 MR 4, Eff. Apr. 19, 1989; 1989 MR 4, Eff. Apr. 20, 1989; 2002 MR 10 Eff. May 28, 2002.

**R 336.1108 Definitions; H.**

Rule 108. As used in these rules:

(a) "Hardboard" means a panel manufactured primarily from interfelted ligno-cellulosic fibers which are consolidated under heat and pressure in a hot press.

(b) "Hardwood plywood" means plywood whose surface layer is a veneer of hardwood.

(c) "Heavy liquid" means a liquid which is less than 10% evaporated at 150 degrees Centigrade as determined by ASTM method d-86. ASTM d-86 is herein adopted by reference in these rules. A copy may be inspected at the Lansing office of the air quality division of the department of environmental quality. A copy may be obtained from the Department of Environmental Quality, P.O. Box 30260, Lansing, Michigan 48909-7760, at a cost of \$40.00. A copy may also be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, at a cost of \$40.00.

(d) "High bake coating" means a coating which is designed to cure only at temperatures of more than 90 degrees Celsius (194 degrees Fahrenheit).

(e) "High-speed dispersion mill" means a mixer that has 1 or more blades which rotate at high speed to disperse coating solids.

History: 1979 ACS 7, Eff. Aug. 22, 1981; 1989 MR 4, Eff. Apr. 19, 1989; 2002 Mr 10, Eff. May 28, 2002.

**R 336.1109**

**Source:** 1998-2000 AACS.

**R 336.1112**

**Source:** 1992 AACS.

**R 336.1113 Definitions; M.**

Rule 113. As used in these rules:

(a) "Major nonattainment air contaminant" means a nonattainment air contaminant for which the potential to emit is significant for a proposed major offset source or for which there is a significant net emissions increase for a proposed major offset modification.

(b) "Major offset modification" means the addition of a process or process equipment or a physical change in, or change in the method of operation of, a process or process equipment at a major offset source which results in a significant net emissions increase of any air contaminant regulated under the clean air act.

(c) "Major offset source" means either of the following:

(i) A stationary source which has a potential to emit of 100 or more tons per year of any air contaminant regulated under the clean air act.

(ii) A particular change at a minor offset source which results in an increase in the potential to emit of 100 or more tons per year of any air contaminant regulated under the clean air act.

(d) "Malfunction" means any sudden, infrequent and not reasonably preventable failure of a source, process, process equipment, or air pollution control equipment to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

(e) "Manufacturing location" means a place where a person is engaged in the making of goods or wares, including the generation of electricity in the processing of material or primarily in the disposal or treatment of solid or liquid waste. For the purpose of assessing a surveillance fee, "manufacturing location" includes all such places, whether publicly or privately owned and contained within 1 geographical site, except places owned and operated by the state government. A power plant, as defined in table 42 of R 336.1401, constitutes a separate manufacturing location when used to supply steam or energy to more than 1 other manufacturing or commercial location. In any case, a power plant that has a capacity of more than 500,000 pounds of steam per hour is considered a separate manufacturing location. For a large industrial complex or other unusual cases, the department may determine that the complex constitutes more than 1 manufacturing location, based on such factors as separate corporate operating divisions, units, or sections.

(f) "Market testing and market development" means the limited or general distribution of a product to the consumer to gather information concerning the demand for the product.



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(g) "Material handling equipment," as referenced in table 31, means a device, contrivance, or equipment used to bag, blend, convey, crush, grind, load, mill, mix, shed, store, transfer, or unload a physical substance.

(h) "Material recovery equipment" means any equipment utilized in the transport and recovery of styrene monomer and other impurities from other products and by-products in the manufacture of polystyrene resin by continuous process, including the styrene devolatilizer unit and styrene recovery unit.

(i) "Minor offset source" means a stationary source which has a potential to emit of less than 100 tons per year for each air contaminant regulated under the clean air act.

(j) "Modify" means making a physical change in, or change in the method of operation of, existing process or process equipment which increases the amount of any air contaminant emitted into the outer air which is not already allowed to be emitted under the conditions of a permit or order or which results in the emission of any toxic air contaminant into the outer air not previously emitted. An increase in the hours of operation or an increase in the production rate up to the maximum capacity of the process or process equipment shall not be considered to be a change in the method of operation unless the process or process equipment is subject to enforceable permit conditions or enforceable orders which limit the production rate or the hours of operation, or both, to a level below the proposed increase.

(k) "Motor vehicle" means any self-propelled vehicle registered for, or requiring registration for, use on the highway.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1989 MR 4, Eff. Apr. 19, 1989; 1990 MR 10, Eff. Nov. 14, 1990; 1992 MR 4, Eff. Apr. 17, 1992; 1993 MR 11, Eff. Nov. 18, 1993; 1995 MR 7, Eff. July 26, 1995; 2002 MR 10, Eff. May 28, 2002.

**R 336.1114**

**Source:** 1993 AACS.

**R 336.1115**

**Source:** 1992 AACS.

**R 336.1116**

**Source:** 1996 AACS.

**R 336.1118 Definitions; R.**

Rule 118. As used in these rules:

(a) "Reactor" means a vessel which may be jacketed to permit temperature control and which is designed to contain materials during chemical reaction.

(b) "Reconstruction" means the replacement of components of an existing facility so that the fixed capital cost of the new components is more than 50% of the fixed capital cost that would be required to construct a comparable entirely new emission unit and so that it is technologically and economically feasible to meet the applicable requirement.

"Fixed capital cost," as used in this subdivision, means the capital needed to provide all of the depreciable components.

(c) "Red coating" means a coating which meets all of the following criteria:

(i) Yellow limit: the hue of hostaperm scarlet.

(ii) Blue limit: the hue of monastral red-violet.

(iii) Lightness limit for metallics: 35% aluminum flake.

(iv) Lightness limit for solids: 50% titanium dioxide white.

(v) Solid reds: hue angle of -11 to 38 degrees and maximum lightness of 23 to 45 units.

(vi) Metallic reds: hue angle of -16 to 35 degrees and maximum lightness of 28 to 45 units.

These criteria are based on Cielab color space, 0/45 geometry. For spherical geometry, specular included, the upper limit is 49 units. The maximum lightness varies as the hue moves from violet to orange. This is a natural consequence of the strength of the colorants, and real colors show this effect.

(d) "Reference test method," with respect to source sampling, means a method or set of procedures, as described in appendix A to these rules, for obtaining source samples.

(e) "Refinery unit" means a set of components and other equipment which are a part of a basic process operation, such as distillation, hydrotreating, cracking, or reforming of hydrocarbons.

(f) "Reid vapor pressure" means the absolute vapor pressure of an organic compound at 100 degrees Fahrenheit as measured by the standard test method set forth in ASTM D-323 or approved equivalent. ASTM D-323 is adopted by reference in these rules. A copy may be inspected at the Lansing office of the air quality division of the department of environmental quality. A copy may be obtained from the Department of Environmental Quality, P.O. Box 30260, Lansing, Michigan 48909-7760, at a cost as of the time of adoption of these rules of \$30.00. A copy may also be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, at a cost as of the time of adoption of these rules of \$30.00.

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(g) "Repetitive production of a product" means, for batch processes or process equipment, producing 10 or more batches of the product. For continuous processes or process equipment, this phrase means running the process or process equipment for a period of more than 10 times the length of time for the raw materials to become the finished product or 24 hours, whichever is longer.

(h) "Research and development activities" means activities conducted for the primary purpose of developing new production processes and products, testing more efficient production processes, or testing methods for preventing or reducing adverse environmental impacts, if the activities are in compliance with both of the following provisions:

(i) The activities do not include the production of an intermediate or final product for sale or exchange for commercial profit, except in a de minimis manner.

(ii) The activities are conducted at a research or laboratory facility that is operated under the close supervision of technically trained personnel.

(i) "Resist coat" means a coating that is applied to a plastic part before metallic plating to prevent deposits of metal on portions of the plastic part.

(j) "Responsible official" means, for the purposes of signing and certifying the truth, accuracy, and completeness of permit applications, monitoring and other reports, and compliance certifications, any of the following:

(i) For a corporation, a president, secretary, treasurer, or vice-president of the corporation who is in charge of a principal business function or any other person who performs similar policy or decision-making functions for the corporation. The person identified in the preceding sentence may appoint another person as his or her authorized representative under either of the following circumstances:

(A) The representative is responsible for the overall operation of 1 or more manufacturing, production, or operating facilities applying for or subject to a permit and either the facilities employ more than 250 persons or have gross annual sales or expenditures of more than \$25,000,000.00.

(B) The representative has responsibilities for the overall operation of a source and is approved in advance by the department. A responsible official shall submit a written request for approval from the department to designate an authorized representative pursuant to this paragraph. The department shall respond, in writing, within 30 days of receipt of the request.

(ii) For a partnership or sole proprietorship, a general partner or the proprietor.

(iii) For a county, city, village, township, state, federal, or other public agency, either a principal executive officer or ranking elected official. For this purpose, a principal executive officer includes the chief executive officer who has responsibility for the overall operations of a principal geographic unit of the agency.

(iv) For affected sources under title IV of the clean air act, the designated representative as defined in title IV of the clean air act.

(k) "Rotogravure printing" means the application of words, designs, pictures, or surface coating to a substrate by means of a roll printing technique that involves intaglio or recessed image areas in the form of cells.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1979 ACS 7, Eff. Aug. 22, 1981; 1989 MR 4, Eff. Apr. 19, 1989; 1992 MR 4, Eff. Apr. 17, 1992; 1995 MR 7, Eff. July 26, 1995; 1996 MR 11, Eff. Dec. 12, 1996; 1997 MR 5, Eff. June 15, 1997; 2002 MR 10, Eff. May 28, 2002.

**R 336.1119**

**Source:** 1998-2000 AACS.

**R 336.1120 Definitions; T.**

Rule 120. As used in these rules:

(a) "Temporary source" means a stationary source, process, or process equipment that commences operation and is located at a geographic site for not more than 12 consecutive months.

(b) "Texture coat" means a coating that is applied to a plastic part which, in its finished form, consists of discrete raised spots of the coating.

(c) "Thin particleboard" means a manufactured board which is 1/4 of an inch or less in thickness and which is made of individual wood particles that have been coated with a binder and formed into flat sheets by pressure.

(d) "Thinning tank," as it pertains to R 336.1631, means any vessel which receives resin from a reactor and to which solvents or other materials are added to thin the resin.

(e) "Tileboard" means paneling that has a colored, waterproof surface coating.

(f) "Toxic air contaminant" or "TAC" means any air contaminant for which there is no national ambient air quality standard and which is or may become harmful to public health or the environment when present in the outdoor atmosphere in sufficient quantities and duration. For the purpose of this definition, all of the following substances shall not be considered to be toxic air contaminants:

(i) Acetylene.

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- (ii) Aluminum metal dust.
- (iii) Aluminum oxide (nonfibrous forms).
- (iv) Ammonium sulfate.
- (v) Argon.
- (vi) Calcium carbonate.
- (vii) Calcium hydroxide.
- (viii) Calcium oxide.
- (ix) Calcium silicate.
- (x) Calcium sulfate.
- (xi) Carbon dioxide.
- (xii) Carbon monoxide.
- (xiii) Cellulose.
- (xiv) Coal dust.
- (xv) Crystalline silica emissions from any of the following processes:
  - (A) Extraction and processing of all metallic or non-metallic minerals.
  - (B) Sand production, processing, and drying.
  - (C) Asphalt production.
  - (D) Concrete production.
  - (E) Glass and fiberglass manufacturing.
  - (F) Foundries.
  - (G) Foundry residual recovery activities.
  - (H) Any other process if the crystalline silica emissions are less than 10% of the total PM-10 emissions.
- (xvi) Emery.
- (xvii) Ethane.
- (xviii) Graphite (synthetic).
- (xix) Grain dust.
- (xx) Helium.
- (xxi) Hydrogen.
- (xxii) Iron oxide.
- (xxiii) Lead.
- (xxiv) Liquefied petroleum gas (l.p.g.).
- (xxv) Methane.
- (xxvi) Neon.
- (xxvii) Nitrogen.
- (xxviii) Nitrogen oxides.
- (xxix) Nuisance particulates.
- (xxx) Oxygen.
- (xxxi) Ozone.
- (xxxii) Perlite.
- (xxxiii) Portland cement.
- (xxxiv) Propane.
- (xxxv) Silicon.
- (xxxvi) Starch.
- (xxxvii) Sucrose.
- (xxxviii) Sulfur dioxide.
- (xxxix) Vegetable oil mist.
- (xl) Water vapor.
- (xli) Zinc metal dust.
- (g) "Toxicological interaction" means the simultaneous exposure to 2 or more hazardous substances which will produce a toxicological response that is greater or less than their individual responses.
- (h) "Transfer efficiency" means the percentage of coating solids material that leaves the coating applicator and remains on the surface of the product.
- (i) "True vapor pressure" means the equilibrium partial pressure exerted by a liquid or the sum of partial pressures exerted by a mixture of liquids. For refined petroleum stock (gasolines and naphthas) and crude oil, the "true vapor pressure" may be determined in accordance with methods described in American petroleum institute bulletin MPMS C19 S2, "Manual of Petroleum Measurement Standards, Chapter 19, Evaporative Loss Measurements, Section 2, Evaporative Loss From

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Floating-Roof Tanks,” 1997. American petroleum institute bulletin MPMS C19 S2 is adopted in these rules by reference. A copy may be inspected at the Lansing office of the air quality division of the department of environmental quality. A copy may be obtained from the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at a cost as of the time of adoption of these rules of \$116.00. A copy may also be obtained from the Global Engineering Documents, HIS Company, 15 Inverness Way East, Englewood, Colorado 80112, at a cost as of the time of adoption of these rules of \$116.00.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1979 ACS 7, Eff. Aug. 22, 1981; 1989 MR 4, Eff. Apr. 19, 1989; 1989 MR 4, Eff. Apr. 20, 1989; 1992 MR 4, Eff. Apr. 17, 1992; 1995 MR 7, Eff. July 26, 1995; 1996 MR 11, Eff. Dec. 12, 1996; 1999 MR 10, Eff. Oct. 28, 1999; 2002 MR 10, Eff. May 28, 2002.

**R 336.1121**

Source: 1989 AACS.

**R 336.1122**

Source: 1998-2000 AACS.

**R 336.1123**

Source: 1995 AACS.

**R 336.1127**

Source: 1980 AACS.

**R 336.1128**

Source: 1980 AACS.

**PART 2. AIR USE APPROVAL**

**R 336.1201**

Source: 1996 AACS.

**R 336.1201a**

Source: 1996 AACS.

**R 336.1202**

Source: 1980 AACS.

**R 336.1203**

Source: 1980 AACS.

**R 336.1204**

Source: 1980 AACS.

**R 336.1205**

Source: 1998-2000 AACS.

**R 336.1206**

Source: 1980 AACS.

**R 336.1207**

Source: 1980 AACS.

**R 336.1208**

Source: 1997 AACS.

**R 336.1208a**

Source: 1996 AACS.

**R 336.1209**

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**Source:** 1995 AACS.

**R 336.1210**

**Source:** 2001 AACS.

**R 336.1211**

**Source:** 2001 AACS.

**R 336.1212**

**Source:** 2001 AACS.

**R 336.1213**

**Source:** 2001 AACS.

**R 336.1214**

**Source:** 2001 AACS.

**R 336.1215**

**Source:** 2001 AACS.

**R 336.1216**

**Source:** 1996 AACS.

**R 336.1217**

**Source:** 1995 AACS.

**R 336.1218**

**Source:** 1995 AACS.

**R 336.1219**

**Source:** 1995 AACS.

**R 336.1220**

**Source:** 1993 AACS.

**R 336.1221**

**Source:** 1997 AACS.

**R 336.1224**

**Source:** 1998-2000 AACS.

**R 336.1225**

**Source:** 1998-2000 AACS.

**R 336.1226**

**Source:** 1998-2000 AACS.

**R 336.1227**

**Source:** 1998-2000 AACS.

**R 336.1228**

**Source:** 1998-2000 AACS.

**R 336.1229**

**Source:** 1998-2000 AACS.

**R 336.1230**

**Source:** 1998-2000 AACS.

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**R 336.1231**  
Source: 1998-2000 AACS.

**R 336.1232**  
Source: 1998-2000 AACS.

**R 336.1240**  
Source: 1989 AACS.

**R 336.1241**  
Source: 1989 AACS.

**R 336.1278**  
Source: 1998-2000 AACS.

**R 336.1279**  
Source: 1995 AACS.

**R 336.1280**  
Source: 1995 AACS.

**R 336.1281**  
Source: 1995 AACS.

**R 336.1282**  
Source: 1995 AACS.

**R 336.1283**  
Source: 1997 AACS.

**R 336.1284**  
Source: 1997 AACS.

**R 336.1285**  
Source: 1997 AACS.

**R 336.1286**  
Source: 1997 AACS.

**R 336.1287**  
Source: 1997 AACS.

**R 336.1288**  
Source: 1995 AACS.

**R 336.1289**  
Source: 1995 AACS.

**R 336.1290**  
Source: 1997 AACS.

**R 336.1299**  
Source: 2001 AACS.

**PART 3. EMISSION LIMITATIONS AND PROHIBITIONS—PARTICULATE MATTER**

**R 336.1301 Standards for density of emissions.**

Rule 301. (1) Except as provided in subrules (2), (3), and (4) of this rule, a person shall not cause or permit to be discharged

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into the outer air from a process or process equipment a visible emission of a density greater than the most stringent of the following:

- (a) A 6-minute average of 20% opacity, except for 1 6-minute average per hour of not more than 27% opacity.
  - (b) A limit specified by an applicable federal new source performance standard.
  - (c) A limit specified as a condition of a permit to install or permit to operate.
- (2) The provisions of this rule shall not apply to any process or process equipment for which fugitive visible emission limitations are specified in any other administrative rule of the department.
- (3) The provisions of subrule (1) of this rule shall not apply to visible emissions due to uncombined water vapor.
- (4) Upon request by the owner of a process or process equipment for which an allowable particulate emission rate is established by R 336.1331, the department may establish an alternate opacity. Such alternate opacity shall not be established by the department unless the department is reasonably convinced of all of the following:
- (a) That the process or process equipment subject to the alternate opacity is in compliance or on a legally enforceable schedule of compliance with the other rules of the department.
  - (b) That compliance with the provisions of subrule (1) of this rule is not technically or economically reasonable.
  - (c) That reasonable measures to reduce opacity have been implemented or will be implemented in accordance with a schedule approved by the department.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1985 MR 2, Eff. Feb. 22, 1985; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1302**

**Source:** 1997 AACS.

**R 336.1303 Grading visible emissions.**

Rule 303. The opacity of a visible emission shall be determined by a qualified observer and shall be certified in accordance with, and using the procedures specified in, reference method 9 or an alternative method approved by the department.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1985 MR 2, Eff. Feb. 22, 1985; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1310**

**Source:** 1998-2000 AACS.

**R 336.1320**

**Source:** 1998-2000 AACS.

**R 336.1330 Electrostatic precipitator control systems.**

Rule 330. (1) After July 1, 1980, it is unlawful to operate any cement kiln, kraft recovery boiler, lime kiln, calciner, pulverized coal-fired boiler, basic oxygen furnace, or gypsum dryer controlled by an electrostatic precipitator control system unless each transformer-rectifier set of the electrostatic precipitator is equipped with a saturable core reactor, silicon-controlled rectifier linear reactor, or equivalent type automatic control system approved by the department. Except for very large precipitators, each automatic controller shall be set to provide maximum power, or optimal power if operating in a sparking mode, from its respective transformer-rectifier set.

(2) Each transformer-rectifier set subject to the provisions of subrule (1) of this rule shall be capable of operating in a spark-limited mode and shall meter and display the primary RMS voltage and amperage, the average secondary amperage, and the average spark rate. The requirement to meter and display the average spark rate shall not apply if the automatic controller employs solid state circuitry to preset power levels based on sparking rate limits.

(3) The department shall waive the requirements of subrule (2) of this rule if both of the following conditions are met:

(a) A satisfactory demonstration is made that the precipitator is capable of providing for compliance with all applicable particulate emission and opacity limits.

(b) The precipitator existed before July 1, 1979, or was covered by an application for a permit to install received by the department before July 1, 1979.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1985 MR 2, Eff. Feb. 22, 1985; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1331 Emission of particulate matter.**

Rule 331. (1) It is unlawful for a person to cause or allow the emission of particulate matter from any process or process equipment in excess of any of the following limits:

(a) The maximum allowable emission rate listed in table 31.

(b) The maximum allowable emission rate listed by the department on its own initiative or by application. A new listed value shall be based upon the control results achievable with the application of the best technically feasible, practical equipment

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available. This applies only to processes and process equipment not assigned a specific emission limit in table 31.

(c) The maximum allowable emission rate specified as a condition of a permit to install or a permit to operate.

(d) The maximum allowable emission rate specified in a voluntary agreement, performance contract, stipulation, or an order of the department.

(e) The maximum allowable emission rate as determined by table 32 for processes and process equipment not covered in subdivisions (a) to (d) of this subrule.

(2) Compliance with any emission limit required by this rule shall be determined by using the corresponding reference test method specified in table 31 or the reference test method deemed appropriate by the department for processes or process equipment not listed in table 31.

(3) Tables 31, 32, 33, 34, and figure 31 read as follows:



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TABLE 31  
Particulate matter emission schedule

Process or process equipment	Capacity rating for each unit	Maximum allowable emission at operating conditions <sup>1</sup> (lbs. Particulate/1,000 lbs. gas except as noted)	Applicable reference test method
<b>A. Fuel burning equipment</b>			
1. Pulverized coal (includes cyclone furnaces)	0-1,000,000 lbs. steam per hour.  Over 1,000,000 lbs. Steam per hour	See figure 31 for maximum emission limit.  Apply to department for specific emission limit.	5B or 5C
2. Other modes of firing coal (other than pulverized)	0-100,000 lbs. steam per hour.  100,000-300,000 lbs. <sup>2</sup> steam per hour.  Over 300,000 lbs. steam per hour.	0.65 until superseded by A.3 and A.4.  0.65 - 0.45  Apply to department for specific emission limit.	5B or 5C
3. Other modes of firing coal (other than pulverized)	0-20,000,000 Btu per hour input.	0.65 effective immediately.	5B or 5C
Existing fuel-burning equipment which is in a single structure and which has a combined coal-fired existing capacity less than 250,000,000 Btu per hour.	20,000,001 to 100,000,000 Btu per hour input.	0.45 compliance shall be achieved as expeditiously as practical, but not later than July 1, 1981.	5B or 5C
	Over 100,000,000 Btu per hour input	0.30 compliance shall be achieved as expeditiously as practical, but not later than December 31, 1982.	5B or 5C
4. Other modes of firing coal (other than pulverized) Existing fuel-burning equipment which is in a single structure and which has a combined existing capacity equal to or greater than 250,000,000 Btu per hours.	All sizes	0.30 compliance shall be achieved as expeditiously as practical, but not later than December 31, 1982.	5B or 5C

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Process or process equipment	Capacity rating for each unit	Maximum allowable emission at operating conditions <sup>1</sup> (lbs. particulate/1,000 lbs. gas except as noted)	Applicable reference test method
5. Other modes of firing coal (new processes or process equipment <sup>6</sup> )	All sizes	0.10	5B or 5C
6. Wood (sawdust, shavings, hogged, other) where heat input of wood fuel greater than 75% of total heat input.  All other combination fuel-burning equipment that uses wood as 1 of the fuels.		0.50  Apply to department for specific emission limit.	5B or 5C
7. Combination fuel-firing or combination fuel/waste-firing (new process or process equipment)	All sizes	Apply to department for specific emission limit.	5B or 5C
	Rating in pounds waste per hour		
<b>B. Incinerators</b>			
1. Residential apartments, commercial and industrial <sup>3,4</sup>	0-100 Over 100	0.65 0.30	5B or 5C 5B or 5C
2. Municipal	All	0.30	5B or 5C
3. Pathological <sup>4</sup>		0.20	5B or 5C
4. Manure drying or incineration <sup>4</sup>		0.20	5B or 5C
5. Liquid waste incinerator		0.10 compliance shall be achieved as expeditiously as practical, but not later than December 31, 1982.	5B or 5C
6. Sewage sludge incinerator		0.20 compliance shall be achieved as expeditiously as practical, but not later than December 31, 1982.	5B or 5C

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Process or process equipment	Capacity rating for each unit	Maximum allowable emission at operating conditions <sup>1</sup> (lbs. Particulate/1,000 lbs. gas except as noted)	Applicable reference test method
<b>C. Steel manufacturing</b>			
1. Basic oxygen furnaces			
A. Primary control equipment <sup>12</sup>		0.057 <sup>11</sup>	5D
B. Secondary control equipment <sup>13</sup>		0.038 <sup>11</sup>	5D
C. Primary control equipment if also used to control charging and tapping emissions		0.057 <sup>11</sup>	5D
2. Electric furnaces			
A. Primary control equipment <sup>14</sup>		0.057 <sup>11</sup>	5D
B. Secondary control equipment <sup>15</sup>		0.010 <sup>11</sup>	5D or 5E
C. Primary control equipment if also used to control charging and tapping emissions		0.010 <sup>11</sup>	5D or 5E
3. New sintering plants <sup>6</sup>			
A. Main windbox		0.067 <sup>11</sup>	5D or 5E
B. Discharge		0.038 <sup>11</sup>	5D
4. Existing sintering plants			
A. Main windbox & discharge		0.125 <sup>11</sup>	5D
5. Blast furnaces			
Blast furnace casthouse air cleaning device <sup>17</sup>		0.02	5D
6. Coke oven combustion stacks		0.095	5D
7. Coke oven push control equipment		0.10 lbs./ton of coke	5D
8. Coke oven quench towers		1,500 <sup>9</sup> or 1,500 <sup>10</sup>	See footnote 16 See footnote 16
9. Scarfing operations		0.057 <sup>11</sup>	5D during scarfing operation

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Process or process equipment	Total plant melt rate in tons/hour	Maximum allowable emission at operating conditions <sup>1</sup> (lbs. Particulate/1,000 lbs. gas except as noted)	Applicable reference test method
<b>D. Ferrous cupola foundry operations<sup>5</sup></b>			
1. Existing production cupolas <sup>7</sup>	0-10	0.40	5B or 5C
	10-20	0.25	5B or 5C
	Over 20	0.15	5B or 5C
2. Existing jobbing cupolas <sup>7</sup>		0.40	5B or 5C
3. Electric arc melting		0.10	5B or 5C
4. Sand handling		0.10	5B or 5C
5. All new cupolas <sup>6</sup>	0-15	1.8 - 0.7 <sup>2, 8</sup>	5B or 5C
	Over 15	0.7 <sup>8</sup>	
<b>E. Chemical and mineral kilns</b>		0.20	5B or 5C
<b>F. Asphalt paving plants</b>			
1. Located within a priority I or II area (before January 1, 1980)		0.30	5B or 5C
2. Located within a priority I or II area (after January 1, 1980)		0.10	5B or 5C
3. Located outside priority I and II areas		0.30	5B or 5C
<b>G. Cement manufacture</b>			
1. Kiln - wet or dry process		0.25	5B or 5C
2. Clinker coolers (before January 1, 1981)  (after January 1, 1981)		0.30	5B or 5C
		0.10	5B or 5C
3. Grinding, crushing, and other material handling.		0.15	5B or 5C

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Process or process equipment	Gas flow rate (SCFM)	Maximum allowable emission at operating conditions <sup>1</sup> (lbs. Particulate/1,000 lbs. gas except as noted)	Applicable reference test method
H. <u>Iron ore pelletizing</u> Grate kilns and traveling grates	Over 600,000 300,000-600,000 100,000-300,000 0-100,000	Apply to department for specific emission limit. 0.10 0.15 0.20	5B or 5C 5B or 5C 5B or 5C
I. <u>Fertilizer plants (including ammoniator, granulator, reactor, dryer, cooler blender and all other processes)</u> Compliance shall be achieved as expeditiously as practical, but not later than January 1, 1981.		0.10	5B or 5C
J. <u>Exhaust systems serving material handling equipment not otherwise listed in table 31</u> Compliance shall be achieved as expeditiously as practical, but not later than July 1, 1981.		0.10	5B or 5C

Footnotes:

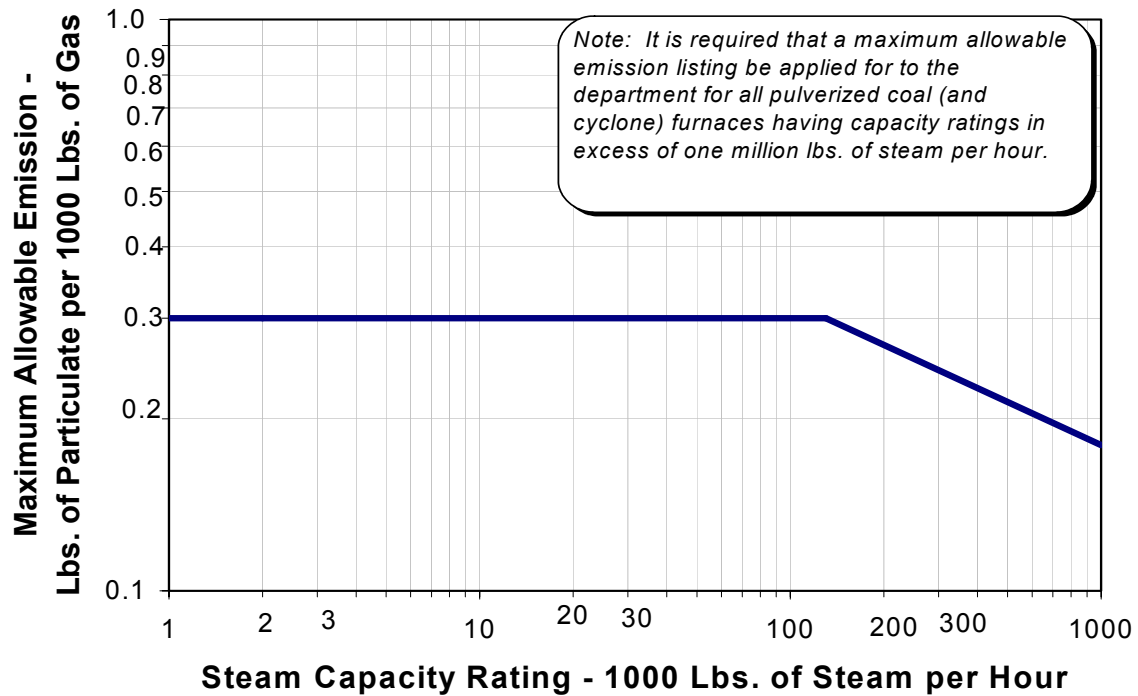
1. Fuel burning and incineration limitation shall be calculated to 50% excess air.
2. Emission limitations for specific ratings are determined by linear interpolation between the ranges shown.
3. These emission limitations do not apply to domestic incinerators (defined as having not more than 5 cubic feet of storage capacity).
4. Afterburner or approved equivalent is mandatory.
5. Differentiation between jobbing and production foundries.  
Cupolas used in a jobbing foundry are the same as those used in a production foundry and vary in size only according to the quantity of iron melted per hour.  
However, the cupolas in a jobbing foundry are run intermittently just long enough at one time to pour the molds that are ready on the foundry floor, job by job. This might be for a 2- to 4-hour period per day for any number of days per week. Production foundry cupolas melt continuously to pour a succession of molds that are constantly being prepared to reserve this continuous flow of iron. This could become 8 hours, 16 hours, or 24 hours per day for any number of days per week.
6. New processes or process equipment are defined as those for which the permit to install was issued after January 18, 1980.
7. Any existing cupolas are considered to be in compliance with table 31 of R 336.1331 if they meet the particulate emission limit for new cupolas.
8. Pounds of particulate per ton of charged material.
9. Milligrams per liter of total dissolved solids in the quench water.
10. Milligrams per liter of total dissolved solids in the make-up water.
11. Compliance shall be determined by means of a comparison between the emission limit and the measured emission rate calculated on a dry basis (pounds particulate per 1,000 pounds dry gas).
12. "Primary control equipment", as applied to basic oxygen furnaces, means the control equipment designed to capture and control particulate emissions during oxygen blowing.
13. "Secondary control equipment", as applied to basic oxygen furnaces, means the control equipment designed to capture and control particulate emissions during process steps other than oxygen blowing.
14. "Primary control equipment", as applied to electric furnaces, means the control equipment designed to capture and control particulate emissions during meltdown and refining.
15. "Secondary control equipment", as applied to electric furnaces, means the control equipment designed to capture and control particulate emissions during process steps other than meltdown and refining.
16. "Standard Methods for the Examination of Water and Wastewater" (14th edition) section 208C, as modified in R

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336.2033, shall be used as the applicable test method.

17. The mass emission limit specified is not applicable where fume suppression technology, approved by the department, is used to control blast furnace casthouse emissions.

FIGURE 31



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TABLE 32

Allowable rate of emission based on process weight rate <sup>a</sup>					
Process weight rate		Rate of Emission	Process weight rate		Rate of emission
Lb/hr	Tons/hr	Lb/hr	Lb/hr	Tons/hr	Lb/hr
100	0.05	0.55	16,000	8.0	16.5
200	0.10	0.88	18,000	9.0	17.9
400	0.20	1.40	20,000	10.0	19.2
600	0.30	1.83	30,000	15.0	25.2
800	0.40	2.22	40,000	20.0	30.5
1,000	0.50	2.58	50,000	25.0	35.4
1,500	0.75	3.38	60,000	30.0	40.0
2,000	1.00	4.10	70,000	35.0	41.3
2,500	1.25	4.76	80,000	40.0	42.5
3,000	1.50	5.38	90,000	45.0	43.6
3,500	1.75	5.95	100,000	50.0	44.6
4,000	2.00	6.52	120,000	60.0	46.3
5,000	2.50	7.58	140,000	70.0	47.8
6,000	3.00	8.56	160,000	80.0	49.0
7,000	3.50	9.49	200,000	100.0	51.2
8,000	4.00	10.40	1,000,000	500.0	69.0
9,000	4.50	11.20	2,000,000	1,000.0	77.6
10,000	5.00	12.00	6,000,000	3,000.0	92.7
12,000	6.00	13.60			

<sup>a</sup> Interpolation of the data in this table for process weight rates up to 60,000 lb/hr shall be accomplished by use of the equation  $E = 4.10 P^{0.67}$  and interpolation and extrapolation of the data for process weight rates in excess of 60,000 lb/hr shall be accomplished by use of the equation  $E = 55.0 P^{0.11} - 40$ , where E = rate of emission in lb/hr and P = process weight in tons/hr.

Process weight -- The total amount of all material introduced into a process, including solid fuels, but excluding liquid fuels and gaseous fuels when these are used as fuels and air introduced for purposes of combustion.

Process weight rate -- For continuous or long-term operation: The total process weight for the entire period of operation or for a typical portion thereof, divided by the number of hours of such period or portion thereof. For batch operations: The total process weight for a period which covers a complete operation or an integral number of cycles, divided by the hours of actual process operation during such period.

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TABLE 33

Priority I areas

County Area

Calhoun T2S, R4W, Section 34.

Genesee Starting on Industrial Avenue, north to Stewart Avenue, east to Hitchcock Street, south to Olive Avenue (extended), south to Robert T. Longway Boulevard, west and southwest to Industrial Avenue.

Lapeer T7N, R12E, that portion of Section 17 which lies south of M-21 and east of Fairground Road.

Monroe Starting where Sandy Creek empties into Lake Erie, northwest to Maple Avenue (extended north-northeast), southwest to Elm Avenue, west to Herr Road, south to Dunbar Road and east to Plum Creek (which empties into Lake Erie).

Saginaw Starting at Tittabawassee Road, east to I-75, east and south to Washington Avenue, west to 6th Street, north to Carrolton Street, northeast to Zilwaukee Street, north to Westervelt Street, north to Tittabawassee Road.

Wayne Area included within the following (counter clockwise): Lake St. Clair to Moross Road to Seven Mile Road to VanDyke Road to Eight Mile Road to Wyoming Road to Seven Mile Road to Schaeffer Road to Fenkell Road to Greenfield Avenue to Joy Road to Southfield Expressway to Ford Road to Telegraph Road to Cherry Hill Road to Beech-Daly Road (extended) to Michigan Avenue to Inkster Road to Carlisle Street to Middle Belt Road to Vanborn Road to Wayne Road to Pennsylvania Road to Middle Belt Road to Sibley Road to Telegraph Road to King Road to Grange Road to Sibley Road to Jefferson Avenue to Bridge Street (Grosse Ile) extended to Detroit River.



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TABLE 34

Priority II areas

County Area

Bay T14N, R5E, Sections 14 to 16 and 21 to 23.

Delta T39N, R22W, Sections 19, 30, south one-half of 17, and south one-half of 18.

Genesee Starting on Industrial Avenue, north to Pierson Road, east to Dort Highway, south to Hitchcock Street, south to Olive Avenue (extended), south to Robert T. Longway Boulevard, west and southwest to Industrial Avenue.

Macomb T4N, R14E, Sections 27, 28, 33, and 34.

Manistee T21N, R16W, Sections 7, 18, and 19;  
T21N, R17W, Sections 12 and 13.

Midland T14N, R2E, Sections 14 to 16, 21 to 23, 26 to 28, and 33 to 35.

Monroe T5S, R10E, Sections 8, 9, and 15 to 17.

Muskegon T9N, R16W, Sections 5 and 6;  
T10N, R16W, Sections 21, 22, and 27 to 34.

Saginaw Northeast section: starting on Tittabawassee Road, east to I-75, south to Wadsworth Avenue, west to I-675, west and north to Tittabawassee Road.

Southwest section: T12N, R4E, the eastern half of Section 34 (that which is east of Maple Street) and Section 35.

St. Clair T6N, R17E, Sections 2 to 4, 9 to 11, 14 to 16, 21, 22, and 28.

Wayne The area included within the following (counter clockwise): Lake St. Clair to Eight Mile Road to Schaeffer Road to McNichols Road to Greenfield Avenue to Schoolcraft Avenue to Evergreen Road to Joy Road to Telegraph Road to Ford Road to Beech-Daly Road to Cherry Hill Road to Inkster Road to Carlisle Street to Middle Belt Road to VanBorn Road to Wayne Road to Ecorse Road to Haggerty Highway to Tyler Road to Belleville Road to I-94 to Rawsonville Road to Oakville Waltz Road to Will Carleton Road to the Huron River to Lake Erie, except subarea listed in table 33.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1985 MR 2, Eff. Feb. 22, 1985; 1992 MR 9, Eff. Oct. 31, 1992; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1349**

**Source:** 1980 AACS.

**R 336.1350**

**Source:** 1985 AACS.

**R 336.1351**

**Source:** 1985 AACS.

**R 336.1352**

**Source:** 1985 AACS.

**R 336.1353**

**Source:** 1985 AACS.

**R 336.1354**

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**Source:** 1985 AACS.

**R 336.1355**

**Source:** 1985 AACS.

**R 336.1356**

**Source:** 1985 AACS.

**R 336.1357**

**Source:** 1985 AACS.

**R 336.1358**

**Source:** 1998-2000 AACS.

**R 336.1359**

**Source:** 1985 AACS.

**R 336.1360**

**Source:** 1985 AACS.

**R 336.1361**

**Source:** 1998-2000 AACS.

**R 336.1362**

**Source:** 1998-2000 AACS.

**R 336.1363**

**Source:** 1998-2000 AACS.

**R 336.1364**

**Source:** 1985 AACS.

**R 336.1365**

**Source:** 1985 AACS.

**R 336.1366**

**Source:** 1985 AACS.

**R 336.1367**

**Source:** 1985 AACS.

**R 336.1370**

**Source:** 1981 AACS.

**R 336.1371 Fugitive dust control programs other than areas listed in table 36.**

Rule 37I. (I) Based on ambient air quality measurements or substantive complaints, the department may request that the person who is responsible for the operation of any facility which processes, uses, stores, transports, or conveys bulk materials, such as, but not limited to, coal, coke, metal ores, limestone, cement, sand, gravel, and material from air pollution control devices, or a facility which has activities specifically identified in R 336.1372 and which facility is in an area not listed in table 36, submit a fugitive dust control program. The department shall notify the person who is responsible for the operation of the facility of the provisions of R 336.1372 which apply to the facility and the reasons for the department's notification. Except as provided in subrule (3) of this rule, the control program shall be submitted to the department not later than 6 months after notification.

(2) A fugitive dust control program which is required by subrule (I) of this rule shall be in writing and shall provide for all of the following:

(a) Using 1 or more combinations of available technologies, operating practices, or methods listed in R 336.1372 as are reasonably necessary to control fugitive dust emissions.

(b) Consideration of the quantity, moisture content, specific gravity, and the particle size distribution of the bulk materials.

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The more friable, drier, lighter, and finer the bulk material is, the more effective the fugitive dust control methods incorporated into the control program shall be.

(c) The keeping and maintenance of records consistent with the various activities to be implemented under the control program.

(d) Identification of the control technologies, methods, or control equipment, if any, to be implemented or installed and the schedule, including increments of progress, for implementation or installation.

(3) Within 3 months following notification by the department that a fugitive dust control program is required, the person who is responsible for operating the facility has the opportunity to demonstrate, to the satisfaction of the department, that any part of the facility is not subject to the provisions of this rule.

(4) If a control program is not submitted within 6 months after notification by the department, then the department may proceed, pursuant to the act, toward the entry of a final order which contains a control program that meets the requirements of subrule (2) of this rule.

(5) The control program is subject to review and approval by the department. The department shall approve a control program only upon the entry of a legally enforceable order or as part of an approved permit to install or operate. If, in the opinion of the department, the program does not adequately meet the requirements set forth in subrule (2) of this rule, then the department may disapprove the program, state its reasons for disapproval, and require the preparation and submittal of an amended program within a specified time period. If, within the specified time period, an amended program is either not submitted or is submitted but, in the opinion of the department, fails to meet the requirements of subrule (2) of this rule, then the department may proceed, pursuant to the act, toward the entry of a final order which contains a control program that meets these requirements.

(6) After approval by the department, the person who is responsible for the preparation of the control program shall begin implementation of the program pursuant to the schedule contained in the control program.

(7) Either the person who is responsible for a facility or the department may request a revision to a department-approved control program to meet changing conditions. The department shall review the revision following the requirements of subrule (5) of this rule.

(8) Table 36 reads as follows:

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TABLE 36

County Area

Bay T14N, R5E, Sections 14 to 16 and 21 to 23.

Calhoun T2S, R4W, Section 34.

Delta T39N, R22W, Sections 19, 30, south one-half of 17, and south one-half of 18.

Genesee Starting on Industrial Avenue, north to Pierson Road, east to Dort Highway, south to Hitchcock Street, south to Olive Avenue (extended), south to Robert T. Longway Boulevard, west and southwest to Industrial Avenue.

Lapeer T7N, R12E, that portion of Section 17 which lies south of M-21 and east of Fairground Road.

Macomb T4N, R14E, Sections 27, 28, 33, and 34.

Manistee T21N, R16W, Sections 7, 18, and 19;  
T21N, R17W, Sections 12 and 13.

Midland T14N, R2E, Sections 14 to 16, 21 to 23, 26 to 28, and 33 to 35.

Monroe Starting where Sandy Creek empties into Lake Erie, northwest to Maple Avenue (extended north-northeast), southwest to Elm Avenue, west to Herr Road, south to Dunbar Road and east to Plum Creek (which empties into Lake Erie).

Muskegon T9N, R16W, Sections 5 and 6;  
T10N, R16W, Sections 21, 22, and 27 to 34.

Saginaw Northeast section: starting on Tittabawassee Road, east to I-75, south to Wadsworth Avenue, west to I-675, west and north to Tittabawassee Road.

Southwest section: T12N, R4E, the eastern half of Section 34 (that which is east of Maple Street) and Section 35.

St. Clair T6N, R17E, Sections 2 to 4, 9 to 11, 14 to 16, 21, 22, and 28.

Wayne Area included within the following (counter clockwise): Lake St. Clair to Moross Road to Seven Mile Road to Vandyke Road to Eight Mile Road to Wyoming Road to Seven Mile Road to Schaeffer Road to Fenkell Road to Greenfield Avenue to Joy Road to Southfield Expressway to Ford Road to Telegraph Road to Cherry Hill Road to Beech-Daly Road (extended) to Michigan Avenue to Inkster Road to Carlisle Street to Middle Belt Road to Vanborn Road to Wayne Road to Pennsylvania Road to Middle Belt Road to Sibley Road to Telegraph Road to King Road to Grange Road to Sibley Road to Jefferson Avenue to Bridge Street (Grosse Ile) extended to Detroit River. Also included is that portion of the City of Riverview which is south of Sibley Road and the City of Trenton.

History: 1979 ACS 5, Eff. Feb. 18, 1981; 1985 MR 4, Eff. Apr. 23, 1985; 2002 MR 5, Eff. Mar. 19, 2002.

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**R 336.1372 Fugitive dust control program; required activities; typical control methods.**

Rule 372. (1) A fugitive dust control program which is required by R 336.1371 and which deals with 1 or more of the fugitive dust sources listed in this rule may include any of the typical control methods listed in this rule for that source.

(2) The following provisions apply to the loading or unloading of open storage piles of bulk materials as a source of fugitive dust:

(a) Open storage piles of bulk materials, hereinafter referred to as "piles", which meet any of the following 3 conditions need not be included in a fugitive dust control program:

(i) All piles of the same material at a manufacturing or commercial location which have a total volume of less than 100 cubic meters (131 yards<sup>3</sup>).

(ii) Any piles at a manufacturing or commercial location if the total annual volumetric throughput of all the stored material at the site is less than 10,000 cubic meters (13,100 yards<sup>3</sup>).

(iii) Any single pile at a manufacturing or commercial location that has a volume of less than 42 cubic meters (55 yards<sup>3</sup>).

(b) Typical control methods for controlling fugitive emissions resulting from the loading or unloading of piles may include, but are not limited to, the following:

(i) Completely enclosing the pile within a building furnished with department-approved air pollution control equipment.

(ii) Using pneumatic conveying or telescopic chutes.

(iii) Spraying the working surface of the pile with water or dust-suppressant compound.

(iv) Directing engine exhaust gases that are generated by the machine used on the piles for loading or unloading upwards.

(v) Minimizing the drop distance from which the material is discharged into the pile. The drop distance shall be specified in the control program.

(vi) Periodic removal of spilled material in areas within 100 meters (328 feet) from the pile. The frequency of removal shall be specified in the control program.

(3) All of the following provisions apply to the transporting of bulk materials as a source of fugitive dust:

(a) Trucks which have less than a 2-ton capacity that are used to transport sand, gravel, stones, peat, and topsoil are exempt from the provisions of this subrule.

(b) Typical control methods for controlling fugitive emissions resulting from the transporting of bulk materials by truck may include, but are not limited to, the following:

(i) Completely covering open-bodied trucks.

(ii) Cleaning the wheels and the body of each truck to remove spilled materials after the truck has been loaded.

(iii) Use of completely enclosed trucks.

(iv) Tarping the truck when operating empty if residue has not been completely removed after emptying.

(v) Cleaning the residue from the inside of the truck after emptying.

(vi) Loading trucks so that no part of the load making contact with any sideboard, side panel, or rear part of the load enclosure comes within 6 inches of the top part of the enclosure.

(vii) Maintaining tight truck bodies so that leakages within the body will be eliminated and future leakages prevented.

(viii) Spraying the material being transported in a vehicle with a dust suppressant. The frequency of spraying shall be specified in the control program.

(ix) Restricting the speed of the vehicle which transports the material. The speed of the vehicle shall be specified in the control program.

(4) The following provision applies to outdoor conveying as a source of fugitive dust: Typical control methods for controlling fugitive emissions resulting from conveying bulk materials may include, but are not limited to, the following:

(a) Completely enclosing all conveyor belts and equipping them with belt wipers and hoppers of proper size to prevent excessive spills.

(b) Enclosing transfer points and, if necessary, exhausting them to a baghouse or similar control device at all times when the conveyors are in operation.

(c) Equipping the conveyor belt with not less than 210-degree enclosures.

(d) Restricting the speed of conveyor belts. The belt speed shall be specified in the control program.

(e) Periodically cleaning the conveyor belt to remove the residual material. The frequency of cleaning shall be specified in the control program.

(f) Minimizing the distance between transfer points. The distance between transfer points shall be specified in the control program.

(g) Removing the spilled material from the ground under conveyors. The frequency of removal shall be specified in the control program.

(5) The following provisions apply to roads and lots as sources of fugitive dust:

(a) Roads and lots which are located within industrial, commercial, and government-owned facilities and which meet the

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following 2 conditions are not subject to the requirement of submitting a fugitive dust control program:

- (i) The traffic volume is less than 10 vehicles per day on a monthly average.
- (ii) The lots are less than 500 square meters (5,382 feet<sup>2</sup>) in area.
- (b) Typical control methods for controlling fugitive emissions resulting from roads and lots located within industrial, commercial, and government-owned facilities may include, but are not limited to, the following:
  - (i) Paving roads and parking lots with a hard material, such as concrete, asphalt, or an equivalent which is approved by the department.
  - (ii) Mechanically cleaning paved surfaces by vacuum sweeping, wet sweeping, or flushing. The frequency of cleaning shall be specified in the control program.
  - (iii) Washing the wheels of every truck leaving the plant premises.
  - (iv) Treating the roads and lots with oil or a dust-suppressant compound which is approved by the department. The frequency of application shall be specified in the control program.
  - (v) Periodically maintaining off-road surfaces with gravel where trucks have frequent access. The frequency of maintenance shall be specified in the control program.
- (6) The following provisions apply to inactive storage piles as sources of fugitive dust:
  - (a) Inactive storage piles that are less than or equal to 500 cubic meters (654 yards<sup>3</sup>) in volume are not subject to the requirement of submitting a fugitive dust control program.
  - (b) Typical control methods for controlling fugitive emissions resulting from inactive storage piles may include, but are not limited to, the following:
    - (i) Completely covering the pile with tarpaulin or other material approved by the department.
    - (ii) Completely enclosing the pile within a building.
    - (iii) Enclosing the pile with not less than 3 walls so that no portion of the stored material is higher than the walls.
    - (iv) Periodically spraying the piles with water or other dust-suppressant compound approved by the department. The frequency of application shall be specified in the control program.
    - (v) Growing vegetation on and around the pile.
- (7) The following provisions apply to building ventilation as a source of fugitive dust:
  - (a) This subrule is applicable to all of the following:
    - (i) Ferrous and nonferrous foundries.
    - (ii) Electric arc furnaces, blast furnace casthouses, sinter plants, and basic oxygen processes at iron and steel production facilities.
    - (iii) Metal heat treating.
    - (iv) Metal forging.
    - (v) Bulk material handling, storage, drying, screening, and crushing.
    - (vi) Metal fabricating and welding.
    - (vii) Briquetting, sintering, and pelletizing operations.
    - (viii) Machining and pressing of metal.
    - (ix) Stone, clay, and glass production.
    - (x) Lime, cement, and gypsum production.
    - (xi) Chemical and allied product production.
    - (xii) Asphalt and concrete mixing operations.
  - (b) Typical control methods for controlling fugitive emissions resulting from building openings, such as roof monitors, powered and unpowered ventilators, doors, windows, and holes in the building structure integrity, may include, but are not limited to, the following:
    - (i) Exhausting the entire building to a dust collection system which is acceptable to the department.
    - (ii) Using local hoods connected to a dust collection system to capture emissions within the building.
    - (iii) Establishing and maintaining operating procedures and internal housekeeping practices (specify details).
    - (iv) Installing removable filter media across the vent openings.
- (8) The following provisions apply to fugitive dust emissions from construction, renovation, or demolition activities located in priority I areas:
  - (a) This subrule is applicable to the owner or prime contractor, except for those owners or prime contractors who construct, renovate, or demolish less than 12 single-family dwelling units per year.
  - (b) Typical control methods for controlling fugitive dust emissions from construction, renovation, or demolition activities may include, but are not limited to, the following:
    - (i) Spraying of all work areas with water or other dust-suppressant compound which is approved by the department.
    - (ii) Completely covering the debris, excavated earth, or other airborne materials with tarpaulin or any other material which is approved by the department.

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(iii) Any other method acceptable to the department.

History: 1979 ACS 5, Eff. Feb. 18, 1981; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1374 Particulate matter contingency measures; area listed in table 37.**

(1) The provisions of this rule apply to all of the following that are within the area listed in table 37:

- (a) Mining operations, standard industrial classification major groups 10 through 14.
- (b) Manufacturing operations, standard industrial classification major groups 20 through 39.
- (c) Railroad transportation, standard industrial classification major group 40.
- (d) Motor freight transportation and warehousing, standard industrial classification major group 42.
- (e) Electric services, standard industrial classification group 491.
- (f) Sanitary services, standard industrial classification group 495.
- (g) Steam supply, standard industrial classification group 496.

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TABLE 37

County Area

Wayne The area bounded by Michigan Avenue from its intersection with I-75 west to I-94; I-94 southwest to Greenfield Road; Greenfield Road south to Schaefer; Schaefer south and east to Jefferson Avenue; Jefferson Avenue (Biddle Avenue in Wyandotte) south to Sibley Road; Sibley Road west to Fort Street; Fort Street south to King Road; King Road east to Jefferson Avenue; Jefferson Avenue south to Helen Avenue; Helen Avenue and extension east to the Trenton Channel; the Trenton Channel north to the Detroit River north to the Ambassador Bridge; Ambassador Bridge to I-75; and I-75 to Michigan Avenue.

(2) Upon a formal determination and written notification by the department or the United States environmental protection agency that an ambient air quality monitor located within the area defined in table 37 has recorded a violation of the national ambient air quality standards for particulate matter with an aerodynamic diameter less than 10 microns (PM-10) as defined in 40 C.F.R. §50.6, a company which is in compliance with the criteria specified in subrule (1) of this rule and which has any portion of its facility property boundaries located within 1 mile of the monitor that recorded the violation shall be in compliance with 1 or both of the following provisions, as applicable:

(a) If the violation is of the annual PM-10 national ambient air quality standards, then the company shall be in compliance with the requirements of subrule (3)(a) of this rule within 60 days after receipt of the notification or shall implement the fugitive dust control strategies submitted pursuant to subrule (3)(b) of this rule within 60 days after receipt of the notification.

(b) If the violation is of the 24-hour PM-10 national ambient air quality standard, then a company that is located in the portion of an area which has a 1-mile radius centered upon the monitor and which remains after the largest contiguous portion of the circular area is removed that contains wind direction sectors for which no detectable wind speed measurements were made for all calendar days used as the basis for the 24-hour PM-10 violation, shall be in compliance with the requirements of subrule (3) of this rule within 60 days after receipt of the notification or shall implement the fugitive dust control strategies submitted pursuant to subrule (3)(b) of this rule within 60 days after receipt of the notification. The determination shall be made using wind rose plots generated with wind speed and direction data obtained from the Detroit metropolitan airport, unless more representative data is available.

If a company elects to submit process or combustion source control strategies pursuant to subrule (3)(b)(ii) or (iii) of this rule, then the company shall commence the schedule to implement the process or combustion source control strategies upon notification of a violation of the national ambient air quality standard for PM-10. If 60 days has passed after a company is notified of a violation of the PM-10 national ambient air quality standard and control strategies have been submitted to the department pursuant to subrule (3)(b) of this rule which have not yet been approved into the state implementation plan by the United States environmental protection agency, then the company shall be subject to the opacity limit in subrule (3)(a) of this rule pursuant to the implementation procedures contained in this rule until the company has been notified that the control strategies have been approved by the United States environmental protection agency as a revision to the Michigan state implementation plan and written notification has been received by the department from the company stating that the controls have been implemented.

The provisions of 40 C.F.R. §50.6 (2000), are adopted by reference in these rules and are available for inspection and purchase at the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at cost. Copies may be obtained from the Superintendent of Documents, Government Printing Office, P.O. Box 371954, Pittsburgh, Pennsylvania 15250-7954, at a cost as of the time of adoption of these rules of \$28.00, or on the United States government printing office internet web site at <http://www.access.gpo.gov>.

(3) The owner or operator of a facility that is subject to the requirements of this rule shall comply with either of the following provisions:

(a) The owner or operator shall not allow the fugitive dust emissions from any paved or unpaved road to exceed an opacity of more than 10%. The opacity shall be determined by method 9 specified in 40 C.F.R. Part 60, appendix A, which is adopted by reference in R 336.2004, except that the number of readings for each vehicle pass will be 3 taken at 5-second intervals. The first reading shall be at the point of maximum opacity. The second and third readings shall be at the same point with respect to the roadway, which is a point where the observer stands at right angles to the plume not less than 15 feet away from the plume and observes approximately 4 feet above the surface of the roadway or parking area. After 4 vehicles have passed, the 12 readings will be averaged.

(b) The owner or operator shall submit, to the department, control strategies and compliance schedules in compliance with any of the following provisions:

(i) The owner or operator shall submit, to the air quality division, control strategies that will reduce total annual facility-wide fugitive dust emissions of PM-10 by not less than 15%.

(ii) An owner or operator may as an alternative to the requirement of paragraph (i) of this subdivision, submit control



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strategies which provide for reductions in allowable PM-10 emissions that are equal to 15% of a facility's total annual fugitive dust emissions of PM-10 from process emission or fuel combustion sources and which include a reasonable schedule for the implementation of the control strategies. The baseline used in calculating the percent reduction for a process or combustion control strategy shall be determined using the maximum operating rate for the source and the lowest allowable particulate emission limit applicable to the source contained in any of the following:

(A) A state administrative rule.

(B) A state consent order.

(C) A state installation permit.

(D) A state operating permit.

(iii) An owner or operator may elect to obtain the PM-10 emission reductions required by this subdivision through a combination of the requirements specified in paragraphs (i) and (ii) of this subdivision.

(4) The control strategies and compliance schedules submitted pursuant to, and complying with, the requirements of subrule (3)(b) of this rule shall be approved by the air quality division through the issuance of department consent orders. Before a company may substitute control strategies or compliance schedules for the opacity limit in subrule (3)(a) of this rule, the state shall have submitted the consent orders to the United States environmental protection agency for approval as a revision to the Michigan state implementation plan, the United States environmental protection agency shall have approved the orders and incorporated them into the Michigan state implementation plan, and the department shall have received written notification from the company stating that the fugitive dust control measures are being implemented or that the company has begun to implement the process source control measure implementation schedule.

(5) For the purposes of this rule, "wind direction sector" means equal portions of a circular area consisting of any 1 of 16 possible areas consisting of 22.5 degrees of angle centered about the compass points north, north northeast, northeast, east northeast, east, east southeast, southeast, south southeast, south, south southwest, southwest, west southwest, west, west northwest, northwest, and north northwest.

History: 1995 MR 7, Eff. July 26, 1995; 2002 MR 5, Eff. Mar. 19, 2002.

**PART 4. EMISSION LIMITATIONS AND PROHIBITIONS—SULFUR-BEARING COMPOUNDS**

**R 336.1401 Emission of sulfur dioxide from power plants.**

Rule 401. (1) In a power plant, it is unlawful for a person to burn fuel that does not comply with the sulfur content limitation of table 41 or which, when burned, results in sulfur dioxide emissions exceeding an equivalent emission rate as shown in table 42, unless all of the following conditions are met:

(a) The source of fuel burning is not subject to federal emission standards for new stationary sources.

(b) An installation permit, if required by part 2, was approved by the department before August 17, 1971.

(c) The user furnishes evidence that the fuel burning does not create, or contribute to, an ambient level of sulfur dioxide in excess of the applicable ambient air quality standards. The evidence shall consist of air quality data or stack dispersion calculations, or both, satisfactory to the department.

(d) The user is operating in compliance with a voluntary agreement, order, stipulation, or variance from the department.

(2) Notwithstanding the provisions of subrule (1) of this rule, an exception from the limitations of table 41 shall not be permitted after January 1, 1980, unless specific authorization is granted by the department.

(3) A person responsible for operation of a source that, on the effective date of the 1973 amendment to this rule or for any anticipated time in the future, is or will be using fuel with a sulfur content in excess of that allowed to be burned on July 1, 1978, as listed in table 41, or which, on such effective date or any anticipated time in the future, is or will be emitting sulfur dioxide in excess of the equivalent emission for that fuel, as shown in table 42, shall submit to the department a written program for compliance with this rule within 60 days after such effective date. This requirement does not apply to a source for which the department has approved an exception to table 41 under the provisions of subrule (1) of this rule.

(4) The program required by subrule (3) of this rule shall include the method by which compliance shall be achieved, a complete description of new equipment to be installed or modifications to existing equipment to be made, and a timetable which specifies, at a minimum, all of the following dates:

(a) The date equipment shall be ordered.

(b) The date construction or modification of equipment shall begin.

(c) The date initial startup of equipment shall begin.

(d) The date emissions shall be reduced to levels shown in tables 41 and 42.

(5) The department may allow any source that is required to submit a compliance program under subrule (3) of this rule an extension to the programmed compliance date, if all of the following conditions are met:

(a) The source of fuel burning is not subject to federal emission standards for new stationary sources.

(b) An installation permit, if required by part 2, was approved by the department before August 17, 1971.

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- (c) The user furnishes satisfactory evidence to the department that the fuel burning does not create or contribute to an ambient level of sulfur dioxide in excess of the applicable ambient air quality standards.
- (6) A person shall not cause or permit the burning of fuel in any fuel-burning equipment that results in an average emission of sulfur dioxide for any calendar month at a rate greater than was emitted by that fuel-burning equipment for the corresponding calendar month of the year 1970, unless otherwise authorized by the department.
- (7) The use of fuels having sulfur contents as set forth in this rule shall not allow degradation in the mass rate of particulate emission, unless otherwise authorized by the department. The department may require source emission tests which may be performed by, or under the supervision of, the department at the expense of the owners and may require the submission of reports to the department both before and after changes are made in the sulfur content in fuel.
- (8) Tables 41 and 42 read as follows:

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TABLE 41

Sulfur in fuel limitations for fuel-burning equipment

Plant capacity <sup>(a)</sup> 1000 lbs. Steam per hour	Maximum sulfur content in fuel <sup>(b)</sup> Percent by weight	
	July 1, 1975	July 1, 1978
0-500	2.0	1.5
Over 500	1.5	1.0

TABLE 42

Equivalent emission rates

% Sulfur in fuels <sup>(c)</sup>	Parts per million by volume corrected to 50% excess air		Pounds of sulfur dioxide per million Btu of heat input	
	Solid fuel <sup>(d)</sup> (12,000 Btu/lb)	Liquid fuel <sup>(e)</sup> (18,000 Btu/lb)	Solid fuel <sup>(d)</sup> (12,000 Btu/lb)	Liquid fuel <sup>(e)</sup> (18,000 Btu/lb)
1.0	590	420	1.67	1.11
1.5	890	630	2.50	1.67
2.0	1,180	840	3.33	2.22

(a) For the purpose of this rule, "plant capacity" is defined as the total steam production capacity of all coal- and oil-burning equipment in a power plant as of August 17, 1971. A "power plant" is defined as a single structure devoted to steam or electric generation, or both, and may contain multiple boilers.

(b) "Maximum sulfur content in fuel" is defined as the average sulfur content in all fuels burned at any one time in a power plant. The sulfur content shall be calculated on the basis of 12,000 Btu per pound for solid fuels and 18,000 Btu per pound for liquid fuels.

(c) The determination of sulfur content (percent by weight) of fuel shall be carried out in accordance with a procedure acceptable to the department.

(d) Solid fuels include both pulverized coal and all other coal.

(e) Liquid fuels include distillate oil (No. 1 and No. 2), heavy oil (No. 4, No. 5, and No. 6), and crude oil.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1402**

**Source:** 1980 AACs.

**R 336.1403 Oil- and natural gas-producing or transporting facilities and natural gas-processing facilities; emissions; operation.**

Rule 403. (1) Except as provided in subrule (3) of this rule, it is unlawful for a person to cause or allow the emission of sour gas from an oil- or natural gas-producing or transporting facility or a natural gas- processing facility without burning or equivalent control of hydrogen sulfide and mercaptans.

(2) Except as provided in subrule (3) of this rule, sour gas that is burned at an oil- or natural gas-producing or transporting facility or at a natural gas-processing facility shall be burned in a properly engineered flare, incinerator, or other combustion system with elevated discharge to the atmosphere. If the flare, incinerator, or other combustion system burns sour gas in such volume and with such hydrogen sulfide concentration that the daily quantity of hydrogen sulfide in the gas is less than 28 pounds, then it shall be equipped with either a pilot flame which will burn continuously when gas flows to the flare, incinerator, or other combustion system or with an automatic ignition system, unless otherwise authorized by the department. If the flare, incinerator, or other combustion system burns sour gas in such volume and with such hydrogen sulfide

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concentration that the daily quantity of hydrogen sulfide in the gas is 28 pounds or more, then it shall be equipped with a continuously burning pilot flame and a mechanism which will operate, upon failure of the pilot flame, to shut off the flow of gas, unless otherwise authorized by the department.

(3) The provisions of subrules (1) and (2) of this rule do not apply to either of the following:

(a) Crude oil-producing facilities that serve a well or group of wells which attained an average production level of 10 or less barrels per day per well before January 1, 1978, unless the department has received 1 complaint of odors regarding the facility, and the owner or operator is unable to or fails to demonstrate, to the satisfaction of the department, that the uncontrolled hydrogen sulfide and mercaptan emissions do not cause an odor nuisance or health hazard.

(b) A vessel or a battery of vessels that releases a total daily volume of vapors of less than 5,000 standard cubic feet, if the owner or operator demonstrates both of the following:

(i) Combustion of the vapors is not economically reasonable.

(ii) The uncontrolled release of the vapors will not cause a violation of the provisions of R 336.1901.

(4) A person shall not cause or allow the emission of sulfur dioxide from a new sweetening facility, unless such emissions are controlled using the best available control technology.

(5) The operator of a sour gas-, crude-, or condensate-sweetening facility shall do all of the following:

(a) Monitor the mass flow rate of hydrogen sulfide either entering the plant or going to the waste gas flare or flares on a periodic schedule specified by the department. The monitoring program shall include a determination of the hydrogen sulfide concentration using colorimetric detector tubes or their equivalent and a determination of the volumetric gas flow rate. The monitoring data shall be submitted to the department in an acceptable format within 30 days following the end of the month in which the data were collected.

(b) Provide fencing, warning signs, or other measures as necessary to warn or deter unauthorized individuals from entering the plant property or buildings. Signs shall read: "Danger--Poison Gas," with at least 1 sign on each side of the plant property.

(c) Provide control of malodorous emissions from any pressure relief valve or valves, storage tanks, and dehydrator vent or vents by burning or equivalent control.

(d) Conduct a program of continuous monitoring of concentrations of hydrogen sulfide in any building enclosing a sweetening process. The sensor shall be placed as close to process equipment as practicable. The system shall be designed, installed, and maintained to provide a visual alarm when the hydrogen sulfide concentration is more than 50 ppm.

(e) Automatically begin a safe and orderly shutdown of all process inflow streams to the facility if the concentration of hydrogen sulfide is more than 100 ppm in any building enclosing a sweetening process. Full operation may be resumed only after successful corrective measures have been applied.

(f) Automatically commence shut-in of the facility within 1 second after extinguishment of the flare flame, unless otherwise authorized by the department. Operation of the facility shall not continue unless corrective measures taken to reignite the flame are successful.

(6) A new sweetening facility shall not be installed at a distance of less than 1,300 feet from an existing residence, unless otherwise authorized by the department. Such authorization shall depend upon a satisfactory showing by a permit applicant that an odor nuisance shall not result from a lesser setback distance.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1989 MR 4, Eff. Apr. 20, 1989; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1404**

Source: 1980 AACS.

**PART 5. EXTENSION OF SULFUR DIOXIDE COMPLIANCE DATE FOR POWER PLANTS PAST JANUARY 1,  
1980**

**R 336.1501**

Source: 1997 AACS.

**R 336.1502**

Source: 1997 AACS.

**R 336.1503**

Source: 1997 AACS.

**R 336.1504**

Source: 1997 AACS.

**R 336.1505**

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**Source:** 1997 AACs.

**R 336.1506**

**Source:** 1997 AACs.

**R 336.1507**

**Source:** 1997 AACs.

**PART 6. EMISSION LIMITATIONS AND PROHIBITIONS—EXISTING SOURCES OF VOLATILE ORGANIC  
COMPOUND EMISSIONS**

**R 336.1601 Definitions.**

Rule 601. As used in this part:

(a) "Existing source" means any of the following:

(i) Any process or process equipment which is subject to the provisions of R 336.1604 to R 336.1618 and which either has been placed into operation before July 1, 1979, or for which an application for a permit to install, pursuant to the provisions of part 2 of these rules, was made to the department before July 1, 1979.

(ii) Any process or process equipment which is subject to the provisions of R 336.1619 to R 336.1625 and which either has been placed into operation before July 1, 1980, or for which an application for a permit to install, pursuant to the provisions of part 2 of these rules, was made to the department before July 1, 1980.

(iii) Any process or process equipment which is subject to the provisions of R 336.1628 and which either has been placed into operation before January 5, 1981, or for which an application for a permit to install, pursuant to the provisions of part 2 of these rules, was made to the department before January 5, 1981.

(iv) Any process or process equipment which is subject to the provisions of R 336.1629 and which either has been placed into operation before January 20, 1984, or for which an application for a permit to install, pursuant to the provisions of part 2 of these rules, was made to the department before January 20, 1984.

(v) Any process or process equipment which is subject to the provisions of R 336.1630 or R 336.1631 and which either has been placed into operation before July 1, 1987, or for which an application for a permit to install, pursuant to the provisions of part 2 of these rules, was made to the department before July 1, 1987.

(vi) Any process or process equipment which is subject to the provisions of R 336.1632 and which either has been placed into operation before the effective date of R 336.1632 or for which an application for a permit to install, pursuant to the provisions of part 2 of these rules, was made to the department before the effective date of R 336.1632.

(vii) Any process or process equipment which is not subject to the provisions of any rule in this part and which either has been placed into operation before July 1, 1979, or for which an application for a permit to install, pursuant to the provisions of part 2 of these rules, was made to the department before July 1, 1979.

The term does not include a process or process equipment operated for research, development, or pilot studies, if the operation is not for the purpose of producing saleable products or goods.

(b) "Person responsible" means a person who owns, leases, controls, operates, or supervises a source of air contaminants.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1979 ACS 7, Eff. Aug. 22, 1981; 1989 MR 4, Eff. Apr. 19, 1989; 1993 MR 11, Eff. Nov. 18, 1993; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1602 Existing sources of volatile organic compound emissions generally.**

Rule 602. (1) A person shall not cause or allow the emission of volatile organic compounds from any existing source in excess of the provisions of any rule of this part or the maximum allowable emission rate specified in any of the following, whichever results in the lowest maximum allowable emission rate:

(a) A permit to install.

(b) A permit to operate.

(c) A renewable operating permit issued under R 336.1210.

(d) A voluntary agreement.

(e) A performance contract.

(f) A stipulation.

(g) An order of the department.

(2) Department approvals for the equivalent emission rates, alternate emission rates, or compliance methods that are authorized pursuant to any of the provisions listed in subdivision (a) of this subrule shall be in compliance with all of the following provisions:

(a) The provisions of this subrule apply to approvals by the department pursuant to any of the following provisions:

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- (i) R 336.1610(5)(a) (More than 24-hour but less than 1-month averaging period).
- (ii) R 336.1610(11) table 63 (Column B - transfer efficiency).
- (iii) R 336.1611(1) (Equivalent control method).
- (iv) R 336.1620(3)(a) (More than 24-hour but less than 1-month averaging period).
- (v) R 336.1621(3) (Transfer efficiency).
- (vi) R 336.1621(4) (Baseline transfer efficiency less than 60%).
- (vii) R 336.1621(6)(a) (More than 24-hour but less than 1-month averaging period).
- (viii) R 336.1621(9)(e) (Metallic-nonmetallic part).
- (ix) R 336.1622(1) (Equivalent control method).
- (x) R 336.1623(1) (Equivalent control method).
- (xi) R 336.1623(8)(d) (Equivalent compliance provisions).
- (xii) R 336.1624(1) (Equivalent emission rate).
- (xiii) R 336.1624(5)(d) (More than 24-hour but less than 1-month averaging period).
- (xiv) R 336.1625(1) (Equivalent control method, except alternative to condenser in R 336.1625(2)(b)).
- (xv) R 336.1625(2)(b) (Alternative control method).
- (xvi) R 336.1625(8) (Alternative control system).
- (xvii) R 336.1628(1) (Equivalent control method).
- (xviii) R 336.1629(1) (Equivalent control method).
- (xix) R 336.1630(1) (Equivalent control method).
- (xx) R 336.1631(1) (Equivalent control method).
- (xxi) R 336.1631(5) (Alternate compliance method).
- (xxii) R 336.1632(8)(a) (More than 24-hour but less than 1-month averaging period).
- (xxiii) R 336.1632(13) (Alternate compliance provisions).
- (xxiv) R 336.1632(14) (Cross-line averaging).
- (xxv) R 336.2004(4) (Alternate test method).
- (xxvi) R 336.2040(5)(a)(i)(A) (Alternate test method).
- (xxvii) R 336.2040(5)(a)(iv) (Alternate test method).
- (xxviii) R 336.2040(9) (Transfer efficiency test method).
- (xxix) R 336.2040(9)(j)(ii) (Alternate measurement procedure).
- (xxx) R 336.2040(10) (Modified capture efficiency test method).
- (xxxi) R 336.2040(11)(a)(iv) (Alternate test method).
- (xxxii) R 336.2040(11)(b)(ii) (Alternate test method).

(b) Department approvals for the equivalent emission rates, alternate emission rates, or compliance methods that are authorized by any of the provisions identified in subdivision (a) of this subrule shall be in compliance with all of the following provisions:

- (i) The proposed approval shall be subject to a 30-day public comment period.
- (ii) When the proposed approval is noticed for a 30-day public comment period, a copy of the notice shall also be sent to the United States environmental protection agency.
- (iii) The proposed approval is subject to a public hearing immediately after the 30-day public comment period that is required in paragraph (i) of this subdivision.
- (iv) The department approval shall become part of a legally enforceable order of the department, permit to install, or permit to operate.
- (v) The legally enforceable document identified in paragraph (iv) of this subdivision shall be sent to the United States environmental protection agency as a request for a revision of the Michigan state implementation plan, together with all of the other information that is required for the submittal of a complete state implementation plan revision request. Department approval and the legally enforceable document shall have no effect on the federally approved state implementation plan until and unless the submitted state implementation plan revision request is formally approved by the United States environmental protection agency.

(3) Department approvals for the equivalent emission rates, alternate emission rates, or compliance methods that are authorized by the provisions identified in subdivision (a) of this subrule shall be in compliance with both of the following provisions:

- (a) The provisions of this subrule apply to approvals by the department pursuant to R 336.1625(4) (Alternate condenser temperature).
- (b) Department approvals for the equivalent emission rates, alternate emission rates, or compliance methods that are authorized pursuant to the provisions identified in subdivision (a) of this subrule shall be in compliance with both of the following provisions:

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(i) The department approval shall become part of a legally enforceable order of the department, permit to install, or permit to operate.

(ii) A copy of the legally enforceable document that is identified in paragraph (i) of this subdivision shall be sent to the United States environmental protection agency.

(4) In R 336.1610, R 336.1621, and R 336.1632, where emission limits are expressed in pounds of volatile organic compounds per gallon of coating, minus water, as applied, the phrase "minus water" shall also include compounds which are used as organic solvents and which are excluded from the definition of volatile organic compound.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1993 MR 4, Eff. Apr. 28, 1993; 1993 MR 11, Eff. Nov. 18, 1993; 2000 MR 4, Eff. Apr. 10, 2000; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1603**

**Source:** 1997 AACS.

**R 336.1604 Storage of organic compounds having true vapor pressure of more than 1.5 psia, but less than 11 psia, in existing fixed roof stationary vessels of more than 40,000-gallon capacity.**

Rule 604. (1) After April 30, 1981, it is unlawful for a person to store any organic compound having a true vapor pressure of more than 1.5 psia, but less than 11 psia, at actual storage conditions in any existing fixed roof stationary vessel of more than 40,000-gallon capacity, unless 1 of the following conditions is met:

(a) The vessel is a pressure tank capable of maintaining working pressures sufficient to prevent organic vapor or gas loss to the atmosphere at all times, except under emergency conditions.

(b) The vessel is equipped and maintained with a floating cover or roof which rests upon, and is supported by, the liquid being contained and has a closure seal or seals to reduce the space between the cover or roof edge and the vessel wall. The seal or any seal fabric shall not have visible holes, tears, or other nonfunctional openings.

(c) The vessel is equipped and maintained with a vapor recovery system, or other control system approved by the department, which recovers not less than 90%, by weight, of the uncontrolled organic vapor that would otherwise be emitted into the atmosphere.

(2) All openings, except stub drains, in any stationary vessel subject to the provisions of this rule shall be equipped with covers, lids, or seals so that all of the following conditions are met:

(a) The cover, lid, or seal is in the closed position at all times, except when in actual use.

(b) Automatic bleeder vents are closed at all times, except when the roof is floated off, or landed on, the roof leg supports.

(c) Rim vents, if provided, are set at the manufacturer's recommended setting or are set to open when the roof is being floated off the roof leg supports.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1979 ACS 7, Eff. Aug. 22, 1981; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1605 Storage of organic compounds having true vapor pressure of 11 or more psia in existing stationary vessels of more than 40,000-gallon capacity.**

Rule 605. (1) After April 30, 1981, it is unlawful for a person to store any organic compound having a true vapor pressure of 11 or more psia at actual storage conditions in any existing stationary vessel of more than 40,000-gallon capacity, unless 1 of the following conditions is met:

(a) The vessel is a pressure tank capable of maintaining working pressures sufficient to prevent organic vapor or gas loss to the atmosphere at all times, except under emergency conditions.

(b) The vessel is equipped and maintained with a vapor recovery system, or other control system approved by the department, which recovers not less than 90%, by weight, of the uncontrolled organic vapor that would otherwise be emitted into the atmosphere.

(2) All openings in any stationary vessel subject to the provisions of this rule shall be equipped with covers, lids, or seals so that the covers, lids, or seals are in a closed position at all times, except when in actual use.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1606 Loading gasoline into existing stationary vessels of more than 2,000-gallon capacity at dispensing facilities handling 250,000 or more gallons per year.**

Rule 606. (1) After June 30, 1980, it is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at a gasoline dispensing facility which is in any county listed in table 61-a and which has a throughput of 250,000 or more gallons per year, unless such stationary vessel is equipped with a permanent submerged fill pipe.

(2) After June 30, 1981, it is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at a gasoline dispensing facility which is outside of any

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county listed in table 61-a and which has a throughput of 250,000 or more gallons per year, unless such stationary vessel is equipped with a permanent submerged fill pipe.

(3) After December 31, 1982, it is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at a gasoline-dispensing facility which is in any area listed in table 61 and which has a throughput of 250,000 or more gallons per year, unless such stationary vessel is controlled by a vapor balance system or an equivalent control system approved by the department. The vapor balance system shall capture displaced gasoline vapor and air by means of a vaportight collection line and shall be designed to return not less than 90%, by weight, of the displaced gasoline vapor from the stationary vessel to the delivery vessel.

(4) Any stationary vessel that is subject to the provisions of subrule (3) of this rule shall be equipped, maintained, or controlled with both of the following:

(a) An interlocking system or procedure to ensure that the vaportight collection line is connected before any gasoline can be loaded.

(b) A device to ensure that the vaportight collection line shall close upon disconnection so as to prevent the release of gasoline vapor.

(5) Any delivery vessel that is subject to the provisions of subrule (3) of this rule shall be vaportight and shall be filled only at a loading facility that is equipped with a system as required by R 336.1608(3) and (4), R 336.1609(2) and (3), R 336.1705(2) and (3), or R 336.1706(2) and (3).

(6) The provisions of subrules (3) and (4) of this rule shall not apply to a stationary vessel at a gasoline-dispensing facility that is served exclusively by gasoline-loading facilities exempted by the department under R 336.1608(7).

(7) Tables 61 and 61-a read as follows:

TABLE 61

List of major metropolitan areas

(Subject to R 336.1606, R 336.1607, R 336.1608, R 336.1703, R 336.1704, and R 336.1705)

Metropolitan area	County	Affected area(1)
1) Detroit	Macomb	T3N, R12E, Sections 3-10, 15-22, & 27-34 T3N, R13E, Sections 25, 35, & 36 T3N, R14E, Sections 11-14 & 19-32 T3N, R15E, Sections 7 and 18 T4N, R12E, Sections 27-34 Macomb County south of the T2N north township line
	Oakland	T1N, R8E, Sections 1-36 T1N, R9E, Sections 1-36 T1N, R10E, Sections 1-36 T1N, R11E, Sections 1-36 T2N, R8E, Sections 1-3, 10-16, & 19-36 T2N, R9E, Sections 1-36 T2N, R10E, Sections 1-36 T2N, R11E, Sections 1-36 T3N, R8E, Sections 13-15, 20-29, & 33-36 T3N, R9E, Sections 1-36 T3N, R10E, Sections 2-36 T3N, R11E, Sections 1-5 & 7-36 T4N, R9E, Sections 17, 19-22, & 26-36 T4N, R10E, Sections 1-3, 10-12, 14-16, 20-23, 25-29, & 31-35 T5N, R10E, Sections 22, 26-29, 34, & 35
	Washtenaw	T2S, R5E, Sections 12-27 & 36 T2S, R6E, Sections 7-11 & 13-36 T2S, R7E, Sections 18, 19, & 29-36 T3S, R6E, Sections 1-6, 8-17, 23, & 24 T3S, R7E, Sections 1-26



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Metropolitan area	County	Affected area(1)
	Wayne	All areas except the following: T1S, R8E, Sections 5-8, 17-20, 30, & 31 T2S, R8E, Sections 5-9, 16-21, & 28-30 T3S, R8E, Sections 31-35 T4S, R8E, Sections 2-36 T4S, R9E, Sections 1-5 & 9-36 T4S, R10E, Sections 7, 8, 17, & 18
2) Flint	Genesee	T6N, R5E, Sections 1-3 T6N, R6E, Sections 1-6, 11-14, 24, & 25 T6N, R7E, Sections 1-30 T7N, R5E, Sections 34-36 T7N, R6E, Sections 1-36 T7N, R7E, Sections 1-36 T7N, R8E, Sections 3-11, 14-19, 21, 22, and 30 T8N, R5E, Sections 13-15, 22-27, & 34-36 T8N, R6E, Sections 1, 2, 11-14, & 19-36 T8N, R7E, Sections 5-11 & 13-36 T9N, R6E, Sections 11, 14, 15, 22-27, 35, and 36 T9N, R7E, Sections 31 & 32
3) Grand Rapids	Kent	T5N, R11W, Sections 4-8, 17, & 18 T5N, R12W, Sections 1, 12, & 13 T6N, R10W, Sections 3-10, 15-21, & 28-33 T6N, R11W, Sections 1-36 T6N, R12W, Sections 1-36 T7N, R10W, Sections 28-35 T7N, R11W, Sections 3-10, 15-23, & 25-36 T7N, R12W, Sections 1-36 T8N, R11W, Sections 13-16, 19-23, & 26-34
	Ottawa	T5N, R13W, Sections 4 & 5 T6N, R13W, Sections 9-16, 21-29, 32, & 33
4) Lansing	Clinton	T5N, R2W, Sections 4, 5, 7-9, 15-18, 20-23, 26-29, & 31-35 T5N, R3W, Sections 33-36
	Eaton	T3N, R3W, Sections 1-3 & 9-12 T4N, R3W, Sections 1-4, 9-16, 20-26, 35, and 36
	Ingham	T3N, R2W, Sections 1-12 14-16, 22, & 23 T4N, R1W, Sections 2-11, 14-23, 26-29, & 33 T4N, R2W, Sections 1-36

(1) Maps of affected areas may be reviewed and inspected at the Lansing office of the air quality division of the department of environmental quality.

TABLE 61-a

List of counties referenced in R 336.1606 through R 336.1609

Allegan	Ingham	Muskegon
Barry	Ionia	Oakland
Bay	Jackson	Ottawa
Berrien	Kalamazoo	Saginaw
Branch	Kent	St. Clair
Calhoun	Lapeer	St. Joseph
Cass	Lenawee	Sanilac

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Clinton	Livingston	Shiawassee
Eaton	Macomb	Tuscola
Genesee	Marquette	Van Buren
Gratiot	Midland	Washtenaw
Hillsdale	Monroe	Wayne
Huron	Montcalm	

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1989 MR 4, Eff. Apr. 20, 1989; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1607 Loading gasoline into existing stationary vessels of more than 2,000-gallon capacity at loading facilities.**

Rule 607. (1) After June 30, 1980, it is unlawful for a person to load, or allow the loading of, gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at a gasoline-loading facility in any county listed in table 61-a, unless the stationary vessel is equipped with a permanent submerged fill pipe.

(2) After June 30, 1981, it is unlawful for a person to load, or allow the loading of, gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at a gasoline-loading facility outside of any county listed in table 61-a, unless the stationary vessel is equipped with a permanent submerged fill pipe.

(3) After December 31, 1982, it is unlawful for a person to load, or allow the loading of, gasoline from a delivery vessel into any existing stationary vessel of more than 2,000-gallon capacity located at either of the following loading facilities, unless the stationary vessel is controlled by a vapor balance system or an equivalent control system approved by the department:

(a) A loading facility located in any area listed in table 61.

(b) A loading facility which is located in any area that is not listed in table 61 and which delivers gasoline to a gasoline-dispensing facility subject to R 336.1606(3) and (4) or R 336.1703(2) and (3). The vapor balance system shall capture displaced gasoline vapor and air by means of a vaportight collection line and shall be designed to return not less than 90%, by weight, of the displaced gasoline vapor from the stationary vessel to the delivery vessel.

(4) Any stationary vessel that is subject to the provisions of subrule (3) of this rule shall be equipped, maintained, or controlled with all of the following:

(a) An interlocking system or procedure to ensure that the vaportight collection line is connected before any gasoline can be loaded.

(b) A device to ensure that the vaportight collection line shall close upon disconnection so as to prevent the release of gasoline vapor.

(c) Pressure-vacuum relief valves on aboveground stationary vessels with a minimum pressure valve setting of 8 ounces, if that setting does not exceed the container's maximum pressure rating.

(5) Any delivery vessel subject to subrule (3) of this rule shall be vaportight.

(6) A person who is responsible for the operation of all control measures required by this rule shall develop written procedures for the operation of all such control measures. The procedures shall be posted in an accessible, conspicuous location near the stationary vessel.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1989 MR 4, Eff. Apr. 20, 1989; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1608 Loading gasoline into delivery vessels at existing loading facilities handling less than 5,000,000 gallons per year.**

Rule 608. (1) After June 30, 1980, it is unlawful for a person to load, or allow the loading of, gasoline from a stationary vessel into any delivery vessel located at an existing gasoline-loading facility which is located in any county listed in table 61-a and which has a throughput of less than 5,000,000 gallons of gasoline per year, unless the delivery vessel is filled by a submerged fill pipe.

(2) After June 30, 1981, it is unlawful for a person to load, or allow the loading of, gasoline from a stationary vessel into any delivery vessel located at an existing gasoline-loading facility which is located outside of any county listed in table 61-a and which has a throughput of less than 5,000,000 gallons of gasoline per year, unless the delivery vessel is filled by a submerged fill pipe.

(3) After December 31, 1982, it is unlawful for a person to load, or allow the loading of, gasoline from a stationary vessel into any delivery vessel located at either of the following loading facilities having a throughput of less than 5,000,000 gallons per year, unless the delivery vessel is controlled by a vapor balance system or an equivalent control system approved by the department:

(a) An existing loading facility located in any area listed in table 61.

(b) An existing loading facility which is located in any area that is not listed in table 61 and which delivers gasoline to a gasoline-dispensing facility subject to R 336.1606(3) and (4) or R 336.1703(2) and (3).

The vapor balance system shall capture displaced gasoline vapor and air by means of a vaportight collection line and shall be designed to return not less than 90%, by weight, of the displaced gasoline vapor from the delivery vessel to the stationary

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vessel.

(4) Any delivery vessel that is loaded at a facility subject to subrule (3) of this rule shall be equipped, maintained, or controlled with all of the following:

(a) An interlocking system or procedure to ensure that the vaportight collection line is connected before any gasoline can be loaded.

(b) A device to ensure that the vaportight collection line will close upon disconnection so as to prevent the release of gasoline vapor.

(c) A device or procedure to accomplish complete drainage before the loading device is disconnected or to prevent liquid drainage from the loading device when not in use.

(d) Pressure-vacuum relief valves that are vaportight and set to prevent the emission of displaced gasoline vapor during the loading of the delivery vessel, except under emergency conditions.

(e) Hatch openings that are kept closed and vaportight during the loading of the delivery vessel.

(5) Any stationary vessel at a facility subject to subrule (3) of this rule shall be vaportight.

(6) A person who is responsible for the operation of all control measures required by this rule shall develop written procedures for the operation of all such control measures. The procedures shall be posted in an accessible, conspicuous location near the loading device.

(7) The provisions of subrule (3) of this rule shall not apply to any gasoline-loading facility that has a throughput of less than 1,000,000 gallons of gasoline per year.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1989 MR 4, Eff. Apr. 20, 1989; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1609**

**Source:** 1989 AACS.

**R 336.1610 Existing coating lines; emission of volatile organic compounds from existing automobile, light-duty truck, and other product and material coating lines.**

Rule 610. (1) A person shall not cause or allow the emission of volatile organic compounds from the coating of automobiles and light-duty trucks, from any existing coating line, in excess of the applicable emission rates shown in table 62.

(2) A person shall not cause or allow the emission of volatile organic compounds from the coating of any of the following, from an existing coating line, in excess of the applicable emission rates shown in column A of table 63 or the equivalent emission rates in column B of table 63:

(a) Cans.

(b) Coils.

(c) Large appliances.

(d) Metal furniture.

(e) Magnet wire.

(f) The nonmetallic surfaces of fabrics, vinyl, or paper.

(3) Subrule (2) of this rule notwithstanding and as an alternative to the allowable emission rate established by table 63, the existing paper coating lines at Fletcher paper company of Alpena may comply with subrule (2) of this rule by not exceeding a volatile organic compound emission rate of 180 tons per calendar year and 30 tons per calendar month.

(4) A person who is responsible for the operation of a coating line that is subject to this rule shall obtain current information and keep records necessary for the determination of compliance with this rule, as required in R 336.2041.

(5) For each coating line, compliance with the emission limits specified in table 62 and table 63 shall be based upon all of the following provisions:

(a) For prime coat operations that utilize an electrodeposition process in automobile and light-duty truck coating lines that are regulated under table 62, compliance shall be based upon all coatings that belong to the same coating category that is used during each calendar month averaging period. For all other coatings, compliance shall be based upon the volume-weighted average of all coatings which belong to the same coating category and which are used during each calendar day averaging period. The department may specifically authorize compliance to be based upon a longer averaging period, which shall not be more than 1 calendar month.

(b) If coatings that belong to more than 1 coating category are used on the same coating line during the specified averaging period, then compliance shall be determined separately for each coating category.

(c) The information and records as required by subrule (4) of this rule.

(6) Compliance with the emission limits specified in this rule shall be determined using the applicable method described in the following subdivisions:

(a) For the prime-electrodeposition process and for the final repair emission limits specified in table 62, the method described in either R 336.2040(12)(a) if the coating line does not have an add-on emissions control device or R 336.2040(12)(b) if the

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coating line has 1 or more add-on emissions control devices.

(b) For the primer surfacer and topcoat emission limits specified in table 62, compliance shall be determined by the methodology described in the publication entitled "Protocol for Determining the Daily Volatile Organic Compound Emission Rate of Automobile and Light-duty Truck Topcoat Operations," EPA-450/3-88-018, December, 1988, which is adopted by reference in these rules. A copy of this document may be inspected at the Lansing office of the air quality division of the department of environmental quality. A copy of this document may be obtained from the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, or the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161, order no. PB-89152276, at a cost as of the time of adoption of these rules of \$36.50 each. References to topcoat operations in this publication shall also apply to primer surfacer lines, with the following added provisions:

(i) Unless specifically included in the adopted publication, if an anti-chip, color-in-prime, blackout, or spot primer coating is applied as part of either a primer surfacer or topcoat coating operation, then the anti-chip, color-in-prime, blackout, or spot primer coating shall be included in the transfer efficiency tests for that coating operation, conducted according to section 18 or 19 of the adopted publication, and the transfer efficiency values in section 20 of the adopted publication shall not be used.

(ii) If spot primer is applied as part of a primer surfacer coating operation, then the daily usage of spot primer, as calculated in section 8 of the adopted publication, may be derived from monthly usage of spot primer based upon the number of vehicles processed in the primer surfacer operation each day.

If an add-on emissions control device is used on the coating line application area to achieve compliance with the primer surfacer or topcoat emission limits specified in table 62, then the capture efficiency shall be determined in accordance with R 336.2040(10).

(c) For the emission limits specified in column B of table 63, the method described in either R 336.2040(12)(e) if the coating line does not have an add-on emissions control device or R 336.2040(12)(f) if the coating line has 1 or more add-on emissions control devices.

(d) For the emission limits specified in column A of table 63, the method described in either R 336.2040(12)(a) if the coating line does not have an add-on emissions control device or R 336.2040(12)(b) if the coating line has 1 or more add-on emissions control devices.

(7) The provisions of this rule, with the exception of the provisions in subrule (4) of this rule, shall not apply to coating lines which are within a stationary source and which have a combined actual emission rate of volatile organic compounds of less than 100 pounds per day or 2,000 pounds per month as of the effective date of this amendatory rule. If the combined actual emission rate equals or is more than 100 pounds per day for a subsequent day or 2,000 pounds per month for a subsequent month, then this rule shall permanently apply to the coating lines.

(8) A person may exclude low-use coatings that total 55 gallons or less per rolling 12-month period at a stationary source from the provisions of this rule, except for subrule (4) of this rule.

(9) Between November 1 and March 31, a person may discontinue the operation of a natural gas-fired afterburner that is used to achieve compliance with the emission limits in this rule, unless the afterburner is used to achieve compliance with, or is required by, any of the following:

(a) Any other provision of these rules.

(b) A permit to install.

(c) A permit to operate.

(d) A voluntary agreement.

(e) A performance contract.

(f) A stipulation.

(g) An order of the department.

(10) If the operation of a natural gas-fired afterburner is discontinued between November 1 and March 31 under subrule (9) of this rule, then both of the following provisions shall apply between November 1 and March 31:

(a) All other provisions of this rule, except for the emission limits, shall remain in effect.

(b) All other measures that are used to comply with the emission limits in this rule between April 1 and October 31 shall continue to be used.

Tables 62 and 63 read as follows:

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Table 62

Volatile organic compound emission limits for existing automobile and light-duty truck coating lines

Coating category	Emission limit
1. Prime-electrodeposition process	1.2 <sup>1</sup>
2. Primer surfacer <sup>3</sup>	14.9 <sup>2</sup>
3. Topcoat <sup>3</sup>	14.9 <sup>2</sup>
4. Final repair	4.8 <sup>1</sup>

Table 63

Volatile organic compound emission limits for existing coating lines

Coating category	Column A <sup>1</sup>	Column B <sup>2</sup>
A. Metallic surfaces		
1. Coating of cans		
(a) Sheet basecoat exterior and interior) and overvarnish; 2-piece can exterior (basecoat and overvarnish)	2.8	
(b) 2- and 3-piece can interior body spray; 2-piece can interior end (spray or roll coat)	4.2	
(c) 3-piece can side-seam	5.5	
(d) End sealing compound	3.7	
2. Coating of coils	2.6	
3. Coating of large appliances <sup>3</sup>	2.8	7.5
4. Coating of metal furniture <sup>3</sup>	3.0	8.4
5. Insulation of magnet wire	1.7	
B. Nonmetallic surfaces		
1. Coating of fabric	2.9	
2. Coating of vinyl	3.8	
3. Coating of paper	2.9	

R 336.1615 Existing vacuum-producing systems at petroleum refineries.

Rule 615. After December 31, 1979, it is unlawful for a person to cause or allow the emission of any volatile organic compound from the condensers, hot wells, or accumulators of any existing vacuum-producing system at a petroleum refinery, unless the emission is controlled by 1 of the following methods:

(a) Capture and disposal in a fuel gas system.

(b) Combustion in a smokeless flare.

(c) Any method approved by the department that recovers not less than 90%, by weight, of the uncontrolled volatile organic compound emissions that would otherwise be emitted into the atmosphere.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1979 ACS 3, Eff. July 18, 1980; 1979 ACS 7, Eff. Aug. 22, 1981; 1989 MR 4,

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1. Pounds of volatile organic compounds per gallon of coating, minus water, as applied.
  2. Pounds of volatile organic compounds per gallon of applied coating solids.
  3. The primer surfacer or topcoat coating category would include an anti-chip, blackout, or spot primer coating if this coating is applied as part of the primer surfacer or topcoat coating operation.
  1. Pounds of volatile organic compounds emitted per gallon of coating, minus water, as applied.
  2. Pounds of volatile organic compounds emitted per gallon of applied coating solids. The purpose of column B emission limits is to allow credit for transfer efficiencies greater than the baseline transfer efficiency. Note: department approval of the transfer efficiency test method is required.
  3. The allowable emission rate does not apply to coatings that are used for the repair of scratches and nicks.

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Eff. Apr. 19, 1989; 1993 MR 4, Eff. Apr. 28, 1993; 1999 MR 10, Eff. Nov. 5, 1999; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1611**

**Source:** 1997 AACS.

**R 336.1612**

**Source:** 1997 AACS.

**R 336.1613**

**Source:** 1997 AACS.

**R 336.1614**

**Source:** 1997 AACS.

**R 336.1615**

**Source:** 1980 AACS.

**R 336.1616 Process unit turnarounds at petroleum refineries.**

Rule 616. (1) After December 31, 1979, it is unlawful for a person to cause or allow the emission of any volatile organic compound from any process unit turnaround at any petroleum refinery, unless the emission is controlled by 1 of the following methods:

(a) Capture and disposal in a fuel gas system.

(b) Combustion in a smokeless flare.

(c) Any method approved by the department that recovers not less than 90%, by weight, of the uncontrolled volatile organic compounds that would otherwise be emitted into the atmosphere.

(2) The provisions of this rule shall apply until the pressure of all vessels in the system is less than 5 psi gauge.

(3) Except as provided for in subrule (4) of this rule, the department shall be notified not less than 30 days before any process unit turnaround subject to the provisions of this rule.

(4) In the case of a process unit turnaround caused by circumstances beyond the control of the refinery owner or operator, the department shall be notified as soon as reasonably possible.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1989 MR 4, Eff. Apr. 20, 1989; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1617 Existing organic compound-water separators at petroleum refineries.**

Rule 617. (1) After December 31, 1980, it is unlawful for a person to operate any existing organic compound-water separator at a refinery unless all separator compartments and all forebays are equipped with a solid cover with all openings sealed and totally enclosing the liquid contents or unless an equivalent method is approved by the department.

(2) All openings in covers, separators, and forebays of any organic compound-water separator subject to the provisions of subrule (1) of this rule shall be equipped with lids or seals so that the lids or seals are in the closed position at all times, except when in actual use.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1618 Use of cutback paving asphalt.**

Rule 618. After December 31, 1982, it is unlawful for a person to manufacture, mix, store, use, or apply cutback paving asphalts from May 1 to September 30, unless prior approval is given by the department. In granting such authorizations, the department shall consider both of the following:

(a) The need for long-life stockpile storage.

(b) Use of such cutback paving asphalt solely as a penetrating prime coat.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1619 Standards for perchloroethylene dry cleaning equipment; adoption of standards by reference.**

Rule 619. A person responsible for the operation of a perchloroethylene dry cleaner that is subject to 40 C.F.R. part 63, subpart M, §§63.320 to 63.325 (2000), the perchloroethylene dry cleaner national emission standard for hazardous air pollutants, shall comply with 40 C.F.R. part 63, subpart M (2000). The provisions of 40 C.F.R. part 63, subpart M, §§63.320 to 63.325, are adopted by reference in these rules and are available for inspection and purchase at the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at cost. Copies may be obtained from the Superintendent of Documents, Government Printing Office, P.O. Box 371954, Pittsburgh, Pennsylvania 15250-7954, at a cost as of the time of adoption of these rules of \$66.00, or on the United States government printing office

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internet web site at <http://www.access.gpo.gov>.

History: 1979 ACS 7, Eff. Aug. 22, 1981; 1993 MR 4, Eff. Apr. 28, 1993 1997 MR 5, Eff. June 15, 1997; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1620**

**Source:** 1998-2000 AACs.

**R 336.1621**

**Source:** 1998-2000 AACs.

**R 336.1622 Emission of volatile organic compounds from existing components of petroleum refineries; refinery monitoring program.**

Rule 622. (1) A person shall not cause or allow the emission of any volatile organic compound from any existing component, as listed in subrule (2) of this rule, of a petroleum refinery, including topping plants, unless all of the provisions of this rule are satisfied or unless an equivalent control method, as approved by the department, is implemented. An alternate acceptable control method is described in 40 C.F.R., subpart GGG, §§60.590 to 60.593 (2000), standards of performance for equipment leaks of volatile organic compound in petroleum refineries. The provisions of 40 C.F.R., part 60, subpart GGG (2000), are adopted by reference in these rules and are available for inspection and purchase at the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at cost. Copies may be obtained from the Superintendent of Documents, Government Printing Office, P.O. Box 371954, Pittsburgh, Pennsylvania 15250-7954, at a cost as of the time of adoption of these rules of \$66.00, or on the United States government printing office internet web site at <http://www.access.gpo.gov>.

(2) A person shall not operate an existing petroleum refinery unless a monitoring program and schedule approved by the department is implemented. This monitoring program and schedule shall provide for, and identify by type and refinery unit, by quarter, all of the following:

(a) An annual inspection of all of the following components:

(i) Pump seals.

(ii) Process valves in liquid volatile organic compound service.

(iii) Process drains.

(iv) Components that are difficult to monitor.

(b) A quarterly inspection of all of the following components:

(i) Compressor seals.

(ii) Process valves in gaseous volatile organic compound service.

(iii) Pressure-relief valves in gaseous volatile organic compound service.

(c) A weekly visual inspection of all pump seals from which volatile organic compounds could leak.

(d) An immediate inspection of any pump seal from which a liquid, which includes a volatile organic compound, is observed dripping.

(e) An inspection of any relief valve from which a volatile organic compound could discharge within 2 normal business days of its venting to the atmosphere.

(f) An inspection as soon as is practical, but not later than 2 normal business days, after the repair of any component that was found leaking.

(3) Except for the visual inspections required by subrule (2)(c) of this rule, all inspections shall be performed using equipment and procedures as specified in federal reference test method 21 as described in R 336.2004. For the purpose of this rule, a component is leaking when a concentration of more than 10,000 ppm, by volume, as methane or hexane, is measured by method 21.

(4) If implementation of the quarterly leak detection program as specified in subrule (2)(b) of this rule shows that 2% or less of the process valves in a given refinery unit are leaking for 2 consecutive quarters, then the inspections of process valves in that refinery unit may be skipped for 1 quarter. If 2% or less of the process valves in a given refinery unit are leaking for 5 consecutive quarters, then the inspections may be done annually. If a subsequent inspection shows that more than 2% of the process valves are leaking, then quarterly inspections of valves shall again be required.

(5) The percent of valves leaking on a refinery unit, as referenced in subrule (4) of this rule, shall be determined by dividing the total number of valves found to be leaking on the refinery unit during the specified monitoring period by the total number of valves on the refinery unit that are required to be monitored by this rule.

(6) The provisions of this rule do not apply to any of the following:

(a) Pressure-relief valves that vent to an operating flare header, fuel gas system, or vapor control device.

(b) Components that are unsafe to monitor, until monitoring personnel would no longer be exposed to immediate danger.

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- (c) Storage tank valves.
  - (d) Valves that are not externally regulated.
  - (e) Components that process, transfer, or contain 1 or more volatile organic compounds in the liquid phase under actual conditions, all of which have a true vapor pressure of less than 1.55 psia.
  - (7) Notwithstanding the provisions of subrule (2) of this rule, the monitoring of components, such as process drains and valves, that are used solely in effecting a refinery unit turnaround is required only within the quarter following the turnaround.
  - (8) A leak that is detected pursuant to the monitoring program provisions of subrule (2) of this rule or for any other reason shall be repaired. Except as provided in subrule (10) of this rule, this leak shall be repaired as soon as possible, but not more than 15 days after the leak is detected. Until the time that the leak is repaired and retested verifying a successful repair, the component causing the leak shall bear a weather-resistant, numbered, identifying tag that indicates the date the leak was discovered.
  - (9) A log of all leaks detected pursuant to the provisions of subrules (2), (3), (5), and (6) of this rule or by any other method shall be maintained by the operator of the petroleum refinery. This log shall identify all of the following:
    - (a) The leaking component by type and location.
    - (b) The number of the identifying tag.
    - (c) The date the leak was discovered.
    - (d) The date the leak was repaired.
    - (e) The date the component was retested after the repair with an indication of the testing results.
    - (f) The person or persons who performed the inspections.The log shall be made available to any representative of the department during normal business hours of the refinery and shall be kept for a minimum of 2 years.
  - (10) If a leak cannot be repaired within 15 days due to circumstances beyond the control of the operator of the petroleum refinery or because the leaking component cannot be repaired unless a significant portion of the refinery unit is shut down for turnaround, then the operator shall maintain a separate log of the nonrepair. The log shall identify all of the following:
    - (a) The leaking component by type, location, and refinery unit.
    - (b) The date on which the leak was discovered.
    - (c) The reason why the leak cannot be repaired within 15 days.
    - (d) The estimated date of repair.
  - (11) Within 25 days of the end of the previous quarter, the operator shall submit to the department a report which contains all of the following information for that quarter:
    - (a) The total number of components tested, by type.
    - (b) The total number of components found leaking and repaired, by type.
    - (c) The accumulative total number of components, by refinery unit and type, found to be leaking and not repaired within the required time period and the reason for nonrepair.
    - (d) The type or types of monitoring equipment utilized during the quarter.The report required by this subrule shall be made on a form approved by the department.
  - (12) The department may require the early shutdown for turnaround of a refinery unit if the department feels that there are a significant number of leaks that would justify this action.
  - (13) Except for safety pressure-relief valves, a person shall not operate existing petroleum refinery equipment that has a valve at the end of a pipe or line which contains a volatile organic compound, unless the pipe or line is sealed with a second valve, blind flange, plug, or cap. The sealing device may be removed only when a sample is being taken or during maintenance operations. A current, written description detailing routine sampling procedures and listing the sealing devices involved shall be maintained and, upon request by the department, shall be submitted to the department in an acceptable format.
- History: 1979 ACS 7, Eff. Aug. 22, 1981; 1993 MR 4, Eff. Apr. 28, 1993; 1997 MR 5, Eff. June 15, 1997; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1623 Storage of petroleum liquids having a true vapor pressure of more than 1.0 psia, but less than 11.0 psia, in existing external floating roof stationary vessels of more than 40,000-gallon capacity.**

- Rule 623. (1) A person shall not store any petroleum liquid having a true vapor pressure of more than 1.0 psia, but less than 11 psia, at actual storage conditions in any existing external floating roof stationary vessel of more than 40,000-gallon capacity, unless the provisions of subrules (2) to (11) of this rule are met or unless an equivalent control method, as approved by the department, is implemented.
- (2) Any stationary vessel subject to the provisions of this rule shall be equipped with a floating roof to which a continuous rim-mounted secondary seal has been attached.
  - (3) The secondary seal, as required by subrule (2) of this rule, shall meet all of the following requirements:



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- (a) There shall be no visible holes, tears, or other nonfunctional openings in the seal or seal fabric.
  - (b) The seal shall be intact and uniformly in place around the circumference of the floating roof between the floating roof and the vessel wall.
  - (c) For vessels equipped with vapor-mounted primary seals, the accumulated area of gaps exceeding 1/8 of an inch in width between the secondary seal and the vessel wall shall not exceed 1.0 square inch per foot of tank diameter.
  - (4) All openings in the external floating roof in any stationary vessel subject to the provisions of this rule, except for automatic bleeder vents, rim space vents, and leg sleeves, shall be equipped with both of the following:
    - (a) Covers, seals, or lids that shall remain in the closed position, except when the openings are in actual use.
    - (b) Projections into the vessel that remain below the liquid surface at all times.
  - (5) All automatic bleeder vents in any stationary vessel subject to the provisions of this rule shall be closed at all times, except when the floating roof is floated off or landed on the roof leg supports.
  - (6) All rim vents in any stationary vessel subject to the provisions of this rule shall be set to open only when the floating roof is being floated off the leg supports or at the manufacturer's recommended setting.
  - (7) All emergency floating roof drains in any stationary vessel subject to the provisions of this rule shall be provided with slotted membrane fabric covers, or equivalent covers, that cover not less than 90% of the area of the opening.
  - (8) A person who is responsible for the operation of a stationary vessel subject to the provisions of this rule shall comply with all of the following requirements:
    - (a) Perform a semiannual routine inspection to ensure compliance with all provisions of subrules (2) to (7) of this rule, with the exception of subrule (3)(c) of this rule.
    - (b) For vessels equipped with a vapor-mounted primary seal, perform an annual inspection to document compliance with the provisions of subrule (3)(c) of this rule.
    - (c) Maintain a record of the results of the inspections performed as required by this subrule. This record shall be made available to any representative of the department and shall be kept for a minimum of 2 years.
    - (d) The provisions of this subrule may, upon written notice, be modified by the department if considered necessary to accomplish the purpose of this rule.
  - (9) The provisions of subrules (2) and (3) of this rule do not apply to any of the following external floating roof stationary vessels:
    - (a) Vessels that are used to store waxy, heavy-pour crude oil.
    - (b) Vessels of less than 420,000-gallon capacity that are used to store produced crude oil and condensate before lease custody transfer.
    - (c) Vessels of welded construction which are equipped with a primary seal consisting of a metallic-type shoe seal, a liquid-mounted foam seal, or a liquid-mounted, liquid-filled-type seal and which contain a petroleum liquid that has a true vapor pressure of less than 4.0 psia.
    - (d) Vessels that are used to store jet naphtha (jet b or jp-4).
  - (10) A person who is responsible for the operation of a stationary vessel that meets 1 of the exemption provisions of subrule (9) of this rule shall maintain records that include all of the following information:
    - (a) The type of vessel and, for a stationary vessel that meets the exemption provisions of subrule (9)(c) of this rule, the type of primary seal.
    - (b) The capacity of the stationary vessel.
    - (c) The contents of the stationary vessel.
    - (d) For a stationary vessel that meets the exemption provisions of subrule (9)(c) of this rule, the true vapor pressure of the petroleum liquid in the stationary vessel.
  - (11) The provisions of subrules (2) to (8) of this rule do not apply to any existing floating roof stationary vessel that contains a petroleum liquid which has a true vapor pressure of less than 1.5 psia. A person who is responsible for such stationary vessel shall maintain a record that includes all of the following information:
    - (a) Average monthly stored liquid temperature.
    - (b) Type of petroleum liquid.
    - (c) Reid vapor pressure of the petroleum liquid.
- The record that is required by this subrule shall be made available to any representative of the department and shall be kept for a minimum of 2 years.

History: 1979 ACS 7, Eff. Aug. 22, 1981; 1993 MR 4, Eff. Apr. 28, 1993; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1624**

**Source:** 1998-2000 AACS.

**R 336.1625**

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**Source:** 1998-2000 AACs.

**R 336.1626**

**Source:** 1997 AACs.

**R 336.1627 Delivery vessels; vapor collection systems.**

Rule 627. (1) A person shall not operate any delivery vessel that is subject to control by a vapor collection system, either vapor balance or recovery system, required by R 336.1606, R 336.1607, R 336.1608, R 336.1609, R 336.1703, R 336.1704, R 336.1705, or R 336.1706, unless all of the provisions of this rule are met.

(2) Delivery vessels shall not sustain a pressure change of more than 0.1 pounds per square inch (3 inches of water) in 5 minutes when pressurized to 0.6 pounds per square inch gauge (18 inches of water) or evacuated to -0.2 pounds per square inch gauge (6 inches of water) using the test procedure described in R 336.2005.

(3) The owner of any delivery vessel that is subject to the provisions of subrule (1) of this rule shall test the delivery vessel in accordance with R 336.2005 each year in the time period from April 1 to June 30. Notification of the exact time and location of the test shall be given to the department, in writing, not less than 7 days before the actual test. Documentation of the test that states the date and location of the test, test procedures, the type of equipment used, and the results of the test shall be submitted to the department not later than July 15.

(4) There shall be no visible liquid leaks from the vessel or collection system, except when the disconnection of dry breaks in liquid lines produces a few drops of liquid.

(5) A person shall not operate any vapor collection system, either vapor balance or recovery system, required by R 336.1606, R 336.1607, R 336.1608, R 336.1609, R 336.1703, R 336.1704, R 336.1705, or R 336.1706, unless all of the provisions of subrules (6) to (10) of this rule are met.

(6) There shall be no gas detector reading greater than or equal to 100% of the lower explosive limit at a distance of 1 inch from the location of the potential leak in the vapor collection system. Leaks shall be detected by a combustible gas detector using the test procedure described in R 336.2005.

(7) There shall be no visible leaks, except from the disconnection of bottom loading dry breaks and from raising top loading vapor heads, where a few drops are permitted.

(8) The vapor collection system shall be designed and operated to prevent gauge pressure in the delivery vessel from exceeding 0.6 pounds per square inch and to prevent vacuum from exceeding -0.2 pounds per square inch gauge.

(9) The department may require the owner or operator of any vapor collection system subject to the provisions of subrule (5) of this rule to test the system in accordance with R 336.2005. The tests shall be conducted within 60 days following receipt of written notification from the department. Notification of the exact time and location of the test shall be given to the department, in writing, not less than 7 days before the actual test. Documentation of the test that states the date and location of the test, test procedures, the type of equipment used, and the results of the test shall be submitted to the department within 60 days following the last date of the test.

(10) Any delivery vessel or component of a vapor collection system that fails to meet any provision of this rule shall not be operated until the necessary repairs have been made, the vessel or collection system has been retested, and the test results have been submitted to the department.

History: 1979 ACS 7, Eff. Aug. 22, 1981; 1993 MR 4, Eff. Apr. 28, 1993; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1628 Emission of volatile organic compounds from components of existing process equipment used in manufacturing synthetic organic chemicals and polymers; monitoring program.**

Rule 628. (1) A person shall not cause or allow the emission of a volatile organic compound from a component of existing manufacturing process equipment at a synthetic organic chemical and polymer manufacturing plant located in any of the following counties, unless all of the provisions of subrules (2) to (16) of this rule are met or unless an equivalent control method, as approved by the department, including the control method described in 40 C.F.R., subpart VV, §§60.480 to 60.489 (2000), standards of performance for equipment leaks of volatile organic compound in the synthetic organic chemicals manufacturing industry, is implemented:

- (a) Kent.
- (b) Livingston.
- (c) Macomb.
- (d) Monroe.
- (e) Muskegon.
- (f) Oakland.
- (g) Ottawa.
- (h) St. Clair.

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(i) Washtenaw.

(j) Wayne.

The provisions of 40 C.F.R., part 60, subpart VV, §§60.480 to 60.489 (2000), are adopted by reference in these rules and are available for inspection and purchase at the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at cost. Copies may be obtained from the Superintendent of Documents, Government Printing Office, P.O. Box 371954, Pittsburgh, Pennsylvania 15250-7954, at a cost as of the time of adoption of these rules of \$66.00, or on the United States government printing office internet web site at <http://www.access.gpo.gov>.

(2) A person shall not operate existing manufacturing process equipment at a synthetic organic chemical and polymer manufacturing plant unless a monitoring program is implemented. The monitoring program shall provide for all of the following:

(a) A quarterly inspection of all components in light liquid or gaseous volatile organic compound service that are not designated as difficult-to-monitor components.

(b) An annual inspection of all difficult-to-monitor components in light liquid or gaseous volatile organic compound service. Annual inspections shall take place during the period of April 1 through June 30.

(c) A weekly visual inspection of all seals of pumps in light liquid service.

(d) An immediate inspection of all components from which a liquid, which includes a volatile organic compound, is observed dripping or from which a gaseous volatile organic compound is observed venting to the atmosphere.

(e) Within 2 normal business days of its venting to the atmosphere, an inspection of each relief valve from which a volatile organic compound could discharge.

(f) An inspection, as soon as is practical, but not later than 5 calendar days, after the repair of a component that was found leaking.

(3) Except for the visual inspections required by the provisions of subrule (2)(c) of this rule, all inspections shall be performed using equipment and procedures as specified in federal reference test method 21 as described and adopted by reference in R 336.2004. A component is leaking when a concentration of more than 10,000 ppm, by volume, as methane or hexane, is measured by method 21.

(4) If implementation of the quarterly leak detection program as specified in subrule (2)(a) of this rule shows that 2% or less of the process valves in a given process unit are leaking for 2 consecutive quarters, then the inspections of process valves in that unit are not required for 1 quarter. If 2% or less of the process valves in a given process unit are leaking for 5 consecutive quarters, then the inspections may be performed annually. If a subsequent inspection shows that more than 2% of the process valves are leaking, then quarterly inspections of valves shall again be required.

(5) The percentage of valves leaking on a process unit, as referenced in subrule (4) of this rule, shall be determined by dividing the total number of valves found to be leaking on the process unit during the specified monitoring period by the total number of valves on the process unit that are required to be monitored by this rule.

(6) The provisions of subrule (2) of this rule do not apply to either of the following:

(a) A component that is equipped with a closed vent system which is capable of capturing and transporting a leakage from the component to a control device that is designed and operated to reduce the volatile organic compound emissions vented to it by 95% or more.

(b) An unsafe-to-monitor component, until conditions would no longer expose monitoring personnel to immediate danger.

(7) The provisions of this rule do not apply to any of the following:

(a) A component that contains or contacts a gaseous stream with a volatile organic compound concentration of less than 10% by weight. Procedures that conform to the general methods in ASTM standards E260, E168, and E169 shall be used to determine the percentage of volatile organic compound contents in the process fluid that is contained in or contacts a piece of equipment. The provisions of ASTM standards E260, E168, and E169 are adopted by reference in these rules. Copies of the standards may be inspected at the Lansing office of the air quality division of the department of Environmental Quality. Copies of the standards may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, or from the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at a cost as of the time of adoption of these rules of \$35.00 each for E260 and E168 and \$30.00 for E169.

(b) A component that operates under a vacuum.

(c) Components of synthetic organic chemical and polymer manufacturing process units that produce 1,100 tons per calendar year or less of light liquid or gaseous volatile organic compounds.

(d) A relief valve that has an upstream rupture disc.

(8) A person shall seal open-ended lines with a second valve, a blind flange, a cap, or a plug, except when the open end is in use, as with relief valves, double block and bleed valves, and composite samplers. In the case of a second valve, the upstream valve shall be closed first after each use.

(9) A component that is found to be leaking pursuant to the monitoring program provisions of subrule (2) of this rule or for

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another reason shall be repaired. Except as provided in subrule (11) of this rule, the leak shall be repaired as soon as possible, but not more than 15 days after the leak is detected. Until such time as the leak is repaired and retested verifying a successful repair, the component that is causing the leak shall bear a weather-resistant, numbered identifying tag that indicates the date the leak was discovered.

(10) A log of all leaks that are detected under subrule (2) of this rule shall be maintained by the person who operates the synthetic organic chemical and polymer manufacturing plant. The log shall list all of the following information:

- (a) The leaking component and synthetic organic chemical and polymer manufacturing process unit.
- (b) The number of the identifying tag.
- (c) The date the leak was discovered.
- (d) The date the leak was repaired.
- (e) The date the component was retested after the repair, with an indication of the testing results.
- (f) The person or persons who performed the inspections.

(11) All of the following provisions apply to delays in the repair of leaking components:

(a) If a leak cannot be repaired within 15 calendar days because the leaking component cannot be repaired unless the synthetic organic chemical and polymer manufacturing process unit is shut down, then the person who operates the synthetic organic chemical and polymer manufacturing plant shall maintain a log of the nonrepair and the leak shall be repaired at the next unit turnaround.

(b) If a leak cannot be repaired within 15 calendar days due to circumstances beyond the control of the person who operates the synthetic organic chemical and polymer manufacturing plant, then the person shall notify the department of the circumstances causing the delay in repair before the end of the fifteenth day and shall maintain a log of the nonrepair. The leak shall be repaired in an expeditious manner, which shall be within 6 months of the date the leak was detected.

(c) The log specified in subdivisions (a) and (b) of this subrule shall list all of the following information:

- (i) The leaking component and synthetic organic chemical and polymer manufacturing process unit.
- (ii) The date on which the leak was discovered.
- (iii) The reason why the leak cannot be repaired within 15 days.
- (iv) The estimated date of repair.
- (v) The number of the identifying tag.

(12) A log of all unsafe-to-monitor components that are not part of the written program as required by subrule (14) of this rule shall be maintained by the person who operates the synthetic organic chemical and polymer manufacturing plant. This log shall list all of the following information:

- (a) The unsafe-to-monitor component and synthetic organic chemical and polymer manufacturing process unit.
- (b) The number of the identifying tag.
- (c) The reason why the component was unsafe to monitor.
- (d) The date, or dates, on which the component was unsafe to monitor.

(13) Not later than 25 calendar days after the end of the previous quarter, the person who operates the synthetic organic chemical and polymer manufacturing plant shall submit, to the department, a report that contains all of the following information for that quarter:

- (a) The total number of components tested, by type.
- (b) The total number of components which are found leaking and which are repaired, by type.
- (c) The total number of components, by synthetic organic chemical and polymer manufacturing process unit and type, which are found to be leaking and which are not repaired within the required time period and the reason for nonrepair.
- (d) The type or types of monitoring equipment utilized during the quarter.
- (e) The total number of unsafe-to-monitor components that are logged as required by the provisions of subrule (12) of this rule.

The report required by this subrule shall be made on a form that is provided by the department.

(14) A person who is subject to the provisions of this rule shall comply with both of the following provisions:

(a) Develop a written program detailing how the provisions of this rule will be implemented. The program shall include listings, by type and synthetic organic chemical and polymer manufacturing process unit, of all of the following:

- (i) All components that are regularly inspected as required in subrule (2) of this rule.
  - (ii) All components that are equipped with a closed vent system subject to the provisions of subrule (6)(a) of this rule.
  - (iii) All components that are exempted from the provisions of this rule pursuant to the provisions of subrule (7)(b), (c), and (d) of this rule.
  - (iv) All difficult-to-monitor components in light liquid or gaseous volatile organic compound service.
  - (v) All components which are located outside a building, which can only be monitored by elevating the monitoring personnel more than 6 feet above ground level, and which are unsafe to monitor during the period of November 1 through March 31.
- (b) Except as noted in subrule (16) of this rule, begin inspections as required in subrule (2) of this rule not later than 6 months

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after the effective date of this rule.

(15) The written program required by the provisions of subrule (14) of this rule and the logs required by the provisions of subrules (10), (11), and (12) of this rule shall be made available, to any representative of the department, on Monday through Friday between 9 a.m. and 5 p.m., at the synthetic organic chemical and polymer manufacturing plant. The logs shall be kept for a minimum of 2 years.

(16) If a synthetic organic chemical and polymer manufacturing process unit that was previously exempt pursuant to the provisions of subrule (7)(c) of this rule produces light liquid or gaseous volatile organic compounds in excess of 1,100 tons in a calendar year, then the provisions of this rule shall apply. Inspections shall begin not later than 6 months after the end of that calendar year and be maintained thereafter.

History: 1989 MR 4, Eff. Apr. 19, 1989; 1993 MR 11, Eff. Nov. 18, 1993; 1997 MR 5, Eff. June 15, 1997; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1629 Emission of volatile organic compounds from components of existing process equipment used in processing natural gas; monitoring program.**

Rule 629. (1) A person shall not cause or allow the emission of a volatile organic compound from a component of existing process equipment at a natural gas processing plant located in any of the following counties, unless all of the provisions of subrules (2) to (16) of this rule are met or unless an equivalent control method, as approved by the department, is implemented:

- (a) Kent.
- (b) Livingston.
- (c) Macomb.
- (d) Monroe.
- (e) Muskegon.
- (f) Oakland.
- (g) Ottawa.
- (h) St. Clair.
- (i) Washtenaw.
- (j) Wayne.

(2) A person shall not operate existing process equipment at a natural gas processing plant unless a monitoring program is implemented. The monitoring program shall provide for all of the following:

(a) A quarterly inspection of all components in gaseous or liquid volatile organic compound service that are not designated as difficult-to-monitor components.

(b) An annual inspection of all difficult-to-monitor components in gaseous or liquid volatile organic compound service. Annual inspections shall take place during the period of April 1 through June 30.

(c) A weekly visual inspection of all pump seals from which volatile organic compounds could leak.

(d) An immediate inspection of all components from which a liquid, which includes a volatile organic compound, is observed dripping or from which a gaseous volatile organic compound is observed venting to the atmosphere.

(e) Within 2 normal business days of its venting to the atmosphere, an inspection of each relief valve from which a volatile organic compound could discharge.

(f) An inspection, as soon as is practical but not later than 5 calendar days after the repair, of a component that was found leaking.

(3) Except for the visual inspections required by the provisions of subrule (2)(c) of this rule, all inspections shall be performed using equipment and procedures as specified in federal reference test method 21 as described and adopted by reference in R 336.2004. A component is leaking when a concentration of more than 10,000 ppm, by volume, as methane or hexane, is measured by method 21.

(4) If implementation of the quarterly leak detection program as specified in subrule (2)(a) of this rule shows that 2% or less of the process valves in a given process unit are leaking for 2 consecutive quarters, then the inspections on process valves in that process unit are not required for 1 quarter. If 2% or less of the process valves in a given process unit are leaking for 5 consecutive quarters, then the inspection may be performed annually. If a subsequent inspection shows that more than 2% of the process valves are leaking, then quarterly inspections of valves shall again be required.

(5) The percentage of valves leaking on a process unit, as referenced in subrule (4) of this rule, shall be determined by dividing the total number of valves that are found to be leaking on the process unit during the specified monitoring period by the total number of valves on the process unit that are required to be monitored by this rule.

(6) A relief valve that is located in a nonfractionating plant that is inspected only by nonplant personnel may be inspected after a pressure release the next time that the inspecting personnel are at the plant, instead of within 5 days as specified in subrule (2)(e) of this rule. A relief valve shall not be allowed to operate for more than 30 days after a pressure release without

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an inspection.

(7) The provisions of subrule (2) of this rule do not apply to any of the following:

(a) A component that is equipped with a closed vent system which is capable of capturing and transporting a leakage from the component to a control device that is designed and operated to reduce the volatile organic compound emissions vented to it by 95% or more.

(b) A pump which is equipped with a dual seal system that includes a barrier fluid and which is equipped with a sensor that will detect a failure of the seal system.

(c) An unsafe-to-monitor component, until conditions do not expose monitoring personnel to immediate danger.

(8) The provisions of this rule do not apply to any of the following:

(a) A component, except any in field gas service, that contains or contacts a process stream that has a volatile organic compound concentration of less than 1.0% by weight. A component in field gas service is excluded from the provisions of this subrule. Procedures that conform to the general methods in ASTM standards E260, E168, and E169 shall be used to determine the percentage of volatile organic compound contents in the process fluid that is contained in or contacts a piece of equipment. ASTM standards E260, E168, and E169 are adopted by reference in R 336.1628.

(b) A component that operates under a vacuum.

(c) A component in heavy liquid service.

(d) A reciprocating compressor in field gas service.

(e) A natural gas processing plant which has a capacity of less than 10,000,000 cubic feet per day and which does not fractionate natural gas liquids.

(f) A relief valve that has an upstream rupture disc.

(9) A person shall seal open-ended lines with a second valve, a blind flange, a cap, or a plug, except when the open end is in use, as with relief valves and double block and bleed valves. In the case of a second valve, the upstream valve shall be closed first after each use.

(10) A component that is found to be leaking pursuant to the monitoring program provisions of subrule (2) of this rule or for another reason shall be repaired. Except as provided in subrule (12) of this rule, the leak shall be repaired as soon as possible, but not more than 15 days after the leak is detected. Until such time as the leak is repaired and retested verifying a successful repair, the component that is causing the leak shall bear a weather-resistant, numbered identifying tag that indicates the date the leak was discovered.

(11) A log of all leaks that are detected pursuant to the provisions of this rule shall be maintained by the person who operates the natural gas processing plant. The log shall list all of the following information:

(a) The leaking component and natural gas process unit.

(b) The number of the identifying tag.

(c) The date the leak was discovered.

(d) The date the leak was repaired.

(e) The date the component was retested after the repair, with an indication of the testing results.

(f) The person or persons who performed the inspections.

(12) All of the following provisions apply to delays in the repair of leaking components:

(a) If a leak cannot be repaired within 15 calendar days because the leaking component cannot be repaired unless the natural gas process unit is shut down, then the person who operates the natural gas processing plant shall maintain a log of the nonrepair and the leak shall be repaired at the next unit turnaround.

(b) If a leak cannot be repaired within 15 calendar days due to circumstances beyond the control of the person who operates the natural gas processing plant, then the person shall notify the department of the circumstances causing the delay in repair before the end of the fifteenth day and shall maintain a log of the nonrepair. The leak shall be repaired in an expeditious manner, which shall not be more than 6 months from the date the leak was detected.

(c) The log specified in subdivisions (a) and (b) of this subrule shall list all of the following information:

(i) The leaking component and natural gas process unit.

(ii) The date on which the leak was discovered.

(iii) The reason why the leak cannot be repaired within 15 days.

(iv) The estimated date of repair.

(v) The number of the identifying tag.

(13) A log of all unsafe-to-monitor components that are not part of the written program as required by the provisions of subrule (15) of this rule shall be maintained by the person who operates the natural gas processing plant. The log shall list all of the following information:

(a) The unsafe-to-monitor component and natural gas process unit.

(b) The number of the identifying tag.

(c) The reason why the component was unsafe to monitor.

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(d) The date, or dates, on which the component was unsafe to monitor.

(14) Not later than 25 calendar days after the end of the previous quarter, the person who operates the natural gas processing plant shall submit, to the department, a report that contains all of the following information for that quarter:

(a) The total number of components tested, by type.

(b) The total number of components which are found leaking and which are repaired, by type.

(c) The total number of components, by natural gas process unit and type, which are found to be leaking and which are not repaired within the required time period and the reason for nonrepair.

(d) The type or types of monitoring equipment utilized during the quarter.

(e) The total number of unsafe-to-monitor components that are logged as required by the provisions of subrule (13) of this rule.

The report required by this subrule shall be made on a form that is provided by the department.

(15) A person who is subject to the provisions of this rule shall comply with both of the following provisions:

(a) Develop a written program detailing how the provisions of this rule will be implemented. The program shall include listings, by type and natural gas process unit, of all of the following:

(i) All components that are regularly inspected as required in subrule (2) of this rule.

(ii) All components that are subject to the provisions of subrule (7)(a) and (b) of this rule.

(iii) All components that are exempted from the provisions of this rule pursuant to the provisions of subrule (8) of this rule.

(iv) All difficult-to-monitor components in gaseous or liquid volatile organic compound service.

(v) All components which are located outside a building, which can only be monitored by elevating the monitoring personnel more than 6 feet above ground level, and which are unsafe to monitor during the period of November 1 through March 31.

(b) Begin inspections, as required in subrule (2) of this rule, not later than 6 months after the effective date of this rule.

(16) The written program required by the provisions of subrule (15) of this rule and the logs required by the provisions of subrules (11), (12), and (13) of this rule shall be made available, to any representative of the department, on Monday through Friday between 9 a.m. and 5 p.m., at the natural gas processing plant. The logs shall be kept for a minimum of 2 years.

History: 1989 MR 4, Eff. Apr. 19, 1989; 1993 MR 11, Eff. Nov. 18, 1993; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1630 Emission of volatile organic compounds from existing paint manufacturing processes.**

Rule 630. (1) After April 19, 1990, a person shall not cause or allow the emission of a volatile organic compound from existing equipment utilized in paint manufacturing located in any of the following counties, unless all of the provisions of subrules (2) to (4) of this rule are met or unless an equivalent control method, as approved by the department, is implemented:

(a) Kent.

(b) Livingston.

(c) Macomb.

(d) Monroe.

(e) Muskegon.

(f) Oakland.

(g) Ottawa.

(h) St. Clair.

(i) Washtenaw.

(j) Wayne.

(2) All stationary and portable mixing tanks and high speed dispersion mills shall be equipped with covers that completely cover the tank or mill opening, except for an opening which is no larger than necessary to allow for safe clearance for the mixer shaft. The tank opening shall be covered at all times, except when operator access is necessary.

(3) The cleaning of paint manufacturing equipment and paint shipping containers shall be done by methods and materials that minimize the emission of volatile organic compounds. These methods and materials shall include 1 of the following:

(a) Hot alkali or detergent cleaning.

(b) High-pressure water cleaning.

(c) Cleaning by use of an organic solvent if the equipment being cleaned is completely covered or enclosed, except for an opening that is no larger than necessary to allow for safe clearance considering the method and materials being used.

(4) Wash solvent shall be stored only in closed containers.

(5) The provisions of this rule do not apply to tanks or equipment which, pursuant to the provisions of this subrule that were in effect on April 19, 1989, was exempt from the provisions of this rule that were in effect on April 19, 1989, but which are now subject to the provisions of this rule, until 1 year after the effective date of this rule.

History: 1989 MR 4, Eff. Apr. 19, 1989; 1993 MR 4, Eff. Apr. 28, 1993; 2002 MR 5, Eff. Mar. 19, 2002.

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**R 336.1631 Emission of volatile organic compounds from existing process equipment utilized in manufacture of polystyrene or other organic resins.**

Rule 631. (l) After December 31, 1989, a person shall not cause or allow the emission of volatile organic compounds from existing process equipment that is utilized in the manufacturing of polystyrene or other organic resins located in any of the following counties, unless all of the provisions of subrules (2) to (10) of this rule are met or unless an equivalent control method, as approved by the department, is implemented:

- (a) Kent.
- (b) Livingston.
- (c) Macomb.
- (d) Monroe.
- (e) Muskegon.
- (f) Oakland.
- (g) Ottawa.
- (h) St. Clair.
- (i) Washtenaw.
- (j) Wayne.

(2) The emission of volatile organic compounds from existing material recovery equipment that is utilized in the manufacture of polystyrene resin by a continuous process shall not be more than 0.12 pounds per 1,000 pounds of polystyrene resin produced.

(3) A person shall not operate an existing reactor, thinning tank, or blending tank that is utilized in the manufacture of a completed organic resin unless either of the following provisions is complied with:

(a) All volatile organic compounds emitted from existing reactors, thinning tanks, and blending tanks shall be vented to control equipment that is designed and operated to reduce the quantity of volatile organic compounds by not less than 95 weight percent. Reflux condensers that are essential to the operation of the resin reactor are not considered to be control equipment.

(b) The total volatile organic compounds emitted to the atmosphere from the reactors, thinning tanks, and blending tanks do not exceed 0.5 pounds per 1,000 pounds of completed organic resin produced.

(4) Notwithstanding the provisions of subrule (3) of this rule, a person shall not operate an existing reactor, thinning tank, or blending tank utilized in the manufacture of a dry organic resin at the Solutia, inc. of Trenton unless either of the following provisions is complied with:

(a) All volatile organic compounds emitted from existing reactors, thinning tanks, and blending tanks shall be vented to control equipment that is designed and operated to reduce the quantity of volatile organic compounds by not less than 95 weight percent. Reflux condensers that are essential to the operation of the resin reactor are not considered to be control equipment.

(b) The total volatile organic compounds emitted to the atmosphere from the reactors, thinning tanks, and blending tanks do not exceed 2.6 pounds per 1,000 pounds of dry organic resin produced.

(5) Compliance with the emission limits specified in subrules (2), (3), and (4) of this rule shall be determined using the method described in R 336.2060 or an alternate method acceptable to the department. Upon request by the department, a person who is responsible for processes that are subject to the provisions of subrule (2), (3), or (4) of this rule shall submit, to the department, test data necessary for a determination of compliance.

(6) Not later than 3 months after the effective date of this rule and thereafter, a person who is responsible for processes that are subject to the provisions of subrule (2), (3), or (4) of this rule shall obtain current information and keep records necessary for a determination of compliance with the provisions of this rule. This information may include any of the following information:

- (a) Emissions test data.
- (b) Material balance calculations.
- (c) Process production rates.
- (d) Control equipment specifications and operating parameters.

(7) A person who is responsible for the operation of existing process equipment that is subject to the provisions of this rule shall submit, to the department, a written program for compliance with this rule or evidence of compliance with this rule. The written program for compliance shall be submitted to the department before October 19, 1989.

(8) The program required by subrule (7) of this rule shall include the method by which compliance with this rule shall be achieved, a description of new equipment to be installed or modifications to existing equipment to be made, and a timetable that specifies, at a minimum, all of the following dates:

- (a) The date or dates equipment shall be ordered.
- (b) The date or dates construction, modification, or process changes shall begin.



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- (c) The date or dates initial start-up of equipment shall begin.
  - (d) The date or dates final compliance shall be achieved.
  - (9) A person may discontinue the operation of a natural gas-fired afterburner, which is used to achieve compliance with the emission limits in this rule, between November 1 and March 31 unless the afterburner is used to achieve compliance with, or is required by, any of the following:
    - (a) Any other provisions of these rules.
    - (b) A permit to install.
    - (c) A permit to operate.
    - (d) A voluntary agreement.
    - (e) A performance contract.
    - (f) A stipulation.
    - (g) An order of the department.
  - (10) If the operation of a natural gas-fired afterburner is discontinued between November 1 and March 31 pursuant to the provisions of subrule (9) of this rule, then both of the following provisions shall apply during this time period:
    - (a) All other provisions of this rule, except for the emission limits, shall remain in effect.
    - (b) All other measures that are used to comply with the emission limits in this rule between April 1 and October 31 shall continue to be used.
- History: 1989 MR 4, Eff. Apr. 19, 1989; 1993 MR 4, Eff. Apr. 28, 1993; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1632**

**Source:** 1993 AACS.

**R 336.1651 Standards for degreasers; adoption by reference.**

Rule 651. A person responsible for the operation of a degreaser subject to the provisions of 40 C.F.R. part 63, subpart T, §§63.460 to 63.469 (2000), the halogenated solvent cleaning national emission standard for hazardous air pollutants, shall comply with the provisions of 40 C.F.R. part 63, subpart T, §§63.460 to 63.469 (2000). The provisions of 40 C.F.R. part 63, subpart T, §§63.460 to 63.469 (2000), are adopted by reference in these rules and are available for inspection and purchase at the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at cost. Copies may also be obtained from the Superintendent of Documents, Government Printing Office, P.O. Box 371954, Pittsburgh, Pennsylvania 15250-7954, at a cost as of the time of adoption of these rules of \$66.00, or on the United States government printing office internet web site at <http://www.access.gpo.gov>.

History: 1997 MR 5, Eff. June 15, 1997; 2002 MR 5, Eff. Mar. 19, 2002.

**PART 7. EMISSION LIMITATIONS AND PROHIBITIONS—NEW SOURCES OF VOLATILE ORGANIC  
COMPOUND EMISSIONS**

**R 336.1701 "New source" defined.**

Rule 701. For the purpose of this part, a "new source" means any process or process equipment which is either placed into operation on or after July 1, 1979, or for which an application for a permit to install, pursuant to the provisions of Part 2 of these rules, is made to the department on or after July 1, 1979, or both, except for any process or process equipment which is defined as an "existing source" under R 336.1601.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1979 ACS 7, Eff. Aug. 22, 1981; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1702 New sources of volatile organic compound emissions generally.**

Rule 702. A person who is responsible for any new source of volatile organic compound emissions shall not cause or allow the emission of volatile organic compound emissions from the new source in excess of the lowest maximum allowable emission rate of the following:

- (a) The maximum allowable emission rate listed by the department on its own initiative or based upon the application of the best available control technology.
- (b) The maximum allowable emission rate specified by a new source performance standard promulgated by the United States environmental protection agency under authority enacted by title I, part A, section 111 of the clean air act, as amended, 42 U.S.C. §7413.
- (c) The maximum allowable emission rate specified as a condition of a permit to install or a permit to operate.
- (d) The maximum allowable emission rate specified in part 6 of these rules which would otherwise be applicable to the new source except for the date that the process or process equipment was placed into operation or for which an application for a permit to install, under the provisions of part 2 of these rules, was made to the department. If the part 6 allowable emission

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rate provides for a future compliance date, then the future compliance date shall also be applicable to a new source pursuant to this subdivision.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1993 MR 4, Eff. Apr. 28, 1993; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1703 Loading gasoline into new stationary vessels of more than 2,000-gallon capacity at dispensing facilities.**

Rule 703. (1) It is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any new stationary vessel of more than 2,000-gallon capacity located at any gasoline dispensing facility, unless such stationary vessel is equipped with a permanent submerged fill pipe.

(2) It is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any new stationary vessel of more than 2,000-gallon capacity located at a new gasoline dispensing facility or an existing gasoline dispensing facility subject to R 336.1606(3) and (4) in any area listed in table 61, unless the stationary vessel is controlled by a vapor balance system or an equivalent control system approved by the department. The vapor balance system shall capture displaced gasoline vapor and air via a vaportight collection line and shall be designed to return not less than 90% by weight of the displaced gasoline vapor from the stationary vessel to the delivery vessel.

(3) Any stationary vessel subject to subrule (2) of this rule shall be equipped, maintained, or controlled with both of the following:

(a) An interlocking system or procedure to ensure that the vaportight collection line is connected before any gasoline can be loaded.

(b) A device to ensure that the vaportight collection line shall close upon disconnection so as to prevent release of gasoline vapor.

(4) Any delivery vessel subject to subrule (2) of this rule shall be vaportight and shall be filled only at a loading facility that is equipped with a system as required in R 336.1606(3) and (4), R 336.1609(2) and (3), R 336.1705(2) and (3), or R 336.1706(2) and (3).

(5) A new stationary vessel at a gasoline dispensing facility that is not subject to the provisions of subrules (2) and (3) of this rule shall be constructed in a manner that will allow the vessel to be retrofitted according to subrules (2) and (3) of this rule.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1704 Loading gasoline into new stationary vessels of more than 2,000-gallon capacity at loading facilities.**

Rule 704. (1) It is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any new stationary vessel of more than 2,000-gallon capacity located at any gasoline loading facility, unless the stationary vessel is equipped with a permanent submerged fill pipe.

(2) It is unlawful for a person to load or allow the loading of gasoline from a delivery vessel into any new stationary vessel of more than 2,000-gallon capacity located at any of the following loading facilities, unless the stationary vessel is controlled by a vapor balance system or an equivalent control system approved by the department:

(a) A new loading facility located in any area listed in table 61.

(b) A new loading facility located in any area not listed in table 61 that delivers gasoline to a gasoline-dispensing facility subject to the provisions of R 336.1606(3) and (4) or R 336.1703(2) and (3).

(c) An existing loading facility subject to the provisions of R 336.1607(3) and (4).

The vapor balance system shall capture displaced gasoline vapor and air via a vaportight collection line and shall be designed to return not less than 90% by weight of the displaced gasoline vapor from the stationary vessel to the delivery vessel.

(3) Any stationary vessel subject to subrule (2) of this rule shall be equipped, maintained, or controlled with all of the following:

(a) An interlocking system or procedure to ensure that the vaportight collection line is connected before any gasoline can be loaded.

(b) A device to ensure that the vaportight collection line shall close upon disconnection so as to prevent release of gasoline vapor.

(c) Pressure-vacuum relief valves on aboveground stationary vessels that have a minimum pressure valve setting of 8 ounces, if such setting does not exceed the container's maximum pressure rating.

(4) Any delivery vessel subject to subrule (2) of this rule shall be vaportight.

(5) A person responsible for the operation of all control measures required by this rule shall develop written procedures for the operation of all control measures specified in subrule (3) of this rule, and the procedures shall be posted in an accessible, conspicuous location near the stationary vessel.

(6) A new stationary vessel at a gasoline loading facility that is not subject to the provisions of subrules (2) and (3) of this rule shall be constructed in a manner that allows the vessel to be retrofitted according to subrules (2) and (3) of this rule.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

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**R 336.1705 Loading gasoline into delivery vessels at new loading facilities handling less than 5,000,000 gallons per year.**

Rule 705. (1) It is unlawful for a person to load, or allow the loading of, gasoline from a stationary vessel into any delivery vessel at a new loading facility that has a throughput of less than 5,000,000 gallons per year, unless the delivery vessel is filled by a submerged fill pipe.

(2) It is unlawful for a person to load, or allow the loading of, gasoline from a stationary vessel into any delivery vessel located at either of the following loading facilities that has a throughput of less than 5,000,000 gallons per year, unless the delivery vessel is controlled by a vapor balance system or an equivalent control system approved by the department:

(a) A new loading facility located in any area listed in table 61.

(b) A new loading facility located in any area which is not listed in table 61 that delivers gasoline to a gasoline-dispensing facility subject to R 336.1606 (3) and (4) or R 336.1703(2) and (3).

The vapor balance system shall capture displaced gasoline vapor and air by means of a vaportight collection line and shall be designed to return not less than 90%, by weight, of the displaced gasoline vapor from the delivery vessel to the stationary vessel.

(3) Any delivery vessel that is loaded at a facility subject to subrule (2) of this rule shall be equipped, maintained, or controlled with all of the following:

(a) An interlocking system or procedure to ensure that the vaportight collection line is connected before any gasoline can be loaded.

(b) A device to ensure that the vaportight collection line shall close upon disconnection so as to prevent the release of gasoline vapor.

(c) A device or procedure to accomplish complete drainage before the loading device is disconnected, or a device or procedure to prevent liquid drainage from the loading device when not in use.

(d) Pressure-vacuum relief valves that are vaportight and set to prevent the emission of displaced gasoline vapor during the loading of the delivery vessel, except under emergency conditions.

(e) Hatch openings that are kept closed and vaportight during the loading of the delivery vessel.

(4) Any stationary vessel at a facility subject to subrule (2) of this rule shall be vaportight.

(5) A person who is responsible for the operation of all control measures required by this rule shall develop written procedures for the operation of all the control measures. The procedures shall be posted in an accessible, conspicuous location near the loading device.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1989 MR 4, Eff. Apr. 20, 1989; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1706**

Source: 1997 AACS.

**R 336.1707**

Source: 1997 AACS.

**R 336.1708**

Source: 1997 AACS.

**R 336.1709**

Source: 1997 AACS.

**R 336.1710**

Source: 1997 AACS.

**PART 8. EMISSION LIMITATIONS AND PROHIBITIONS--OXIDES OF NITROGEN**

**R 336.1801**

Source: 1998-2000 AACS.

**PART 9. EMISSION LIMITATIONS AND PROHIBITIONS—MISCELLANEOUS**

**R 336.1901 Air contaminant or water vapor; when prohibited.**

Rule 901. Notwithstanding the provisions of any other department rule, a person shall not cause or permit the emission of an air contaminant or water vapor in quantities that cause, alone or in reaction with other air contaminants, either of the

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following:

- (a) Injurious effects to human health or safety, animal life, plant life of significant economic value, or property.
- (b) Unreasonable interference with the comfortable enjoyment of life and property.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1906 Diluting and concealing emissions.**

Rule 906. Unless prior written approval is obtained from the department, a person shall not build, erect, install, or use any article, machine, equipment, or other contrivance if the sole purpose of the article, machine, equipment, or other contrivance is to dilute or conceal an emission without resulting in a reduction in the total release of air contaminants into the atmosphere. This rule does not apply to the control of odors.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1910**

**Source:** 1980 AACS.

**R 336.1911 Malfunction abatement plans.**

Rule 911. (1) Upon request of the department, a person responsible for the operation of a source of an air contaminant shall prepare a malfunction abatement plan to prevent, detect, and correct malfunctions or equipment failures resulting in emissions exceeding any applicable emission limitation.

(2) A malfunction abatement plan required by subrule (1) of this rule shall be in writing and shall, at a minimum, specify all of the following:

(a) A complete preventative maintenance program, including identification of the supervisory personnel responsible for overseeing the inspection, maintenance, and repair of air-cleaning devices, a description of the items or conditions that shall be inspected, the frequency of the inspections or repairs, and an identification of the major replacement parts that shall be maintained in inventory for quick replacement.

(b) An identification of the source and air-cleaning device operating variables that shall be monitored to detect a malfunction or failure, the normal operating range of these variables, and a description of the method of monitoring or surveillance procedures.

(c) A description of the corrective procedures or operational changes that shall be taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.

(3) A malfunction abatement plan required by subrule (1) of this rule shall be submitted to the department and shall be subject to review and approval by the department. If, in the opinion of the commission, the plan does not adequately carry out the objectives as set forth in subrules (1) and (2) of this rule, then the department may disapprove the plan, state its reasons for disapproval, and order the preparation of an amended plan within the time period specified in the order. If, within the time period specified in the order, an amended plan is submitted which, in the opinion of the department, fails to meet the objective, then the department, on its own initiative, may amend the plan to cause it to meet the objective.

(4) Within 180 days after the department approves a malfunction abatement plan, a person responsible for the preparation of a malfunction abatement plan shall implement the malfunction abatement plan required by subrule (1) of this rule.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1912**

**Source:** 1995 AACS.

**R 336.1913**

**Source:** 2001 AACS.

**R 336.1914**

**Source:** 2001 AACS.

**R 336.1915 Enforcement discretion in instances of excess emissions resulting from malfunction, start-up, or shutdown.**

Rule 915. (1) In determining whether the department will pursue enforcement against a person, the department shall consider evidence that the emission violations resulted from a malfunction, start-up, or shutdown.

(2) If the department determines that the emission violations resulted from a malfunction, start-up, or shutdown, then the department may use enforcement discretion when resolving the emission violations based upon subrules (3) and (4) of this rule, as applicable.

(3) A person may submit evidence to the department for its consideration in determining that the emission violations resulted

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from a malfunction. The evidence shall demonstrate all of the following, as applicable:

- (a) The excess emissions were a result of a sudden and unavoidable breakdown of process or control equipment, beyond the reasonable control of the person.
  - (b) The air pollution control equipment, process equipment, and processes were maintained and operated in a manner consistent with good practice for minimizing emissions, to the maximum extent practicable.
  - (c) The excess emissions caused by a bypass (an intentional diversion of control equipment) were unavoidable to prevent loss of life, personal injury, or severe property damage.
  - (d) Repairs were made in an expeditious fashion when the person knew or should have known that applicable emission limitations were being exceeded. To the extent practicable, off-shift labor and overtime shall have been utilized to ensure that the repairs were made expeditiously.
  - (e) The amount and duration of excess emissions, including any bypass, were minimized to the maximum extent practicable during periods of the emissions.
  - (f) All reasonably possible steps were taken to minimize the impact of the excess emissions on ambient air quality.
  - (g) The excess emissions resulting from the malfunction were not part of a recurring pattern indicative of inadequate design, operation, or maintenance.
  - (h) The malfunction was an infrequent event and was not reasonably preventable.
  - (i) All emission monitoring systems were kept in operation if at all possible.
  - (j) The person responsible for operating the source of air contaminants has a malfunction abatement plan, consistent with the requirements set forth in R 336.1911(2) and with both of the following provisions:
    - (i) Any malfunction abatement plan developed in accordance with R 336.1911(2) shall be maintained onsite and available for inspection, upon request, by the department for the life of the emission unit or units. The department may require that the person responsible for the malfunction abatement plan make revisions to the plan. The person shall revise the malfunction abatement plan within 45 days after a request by the department. The revised malfunction abatement plan shall be developed in accordance with R 336.1911(2).
    - (ii) If the malfunction abatement plan fails to address or inadequately addresses an event that meets the characteristics of a malfunction at the time the plan is initially developed, then the person shall revise the malfunction abatement plan within 45 days after the event occurs. The revised malfunction abatement plan shall be developed in accordance with R 336.1911(2).
  - (k) The excess emissions presenting an imminent threat to human health, safety, or the environment were reported to the department as soon as possible. Unless otherwise specified in the facility's permit, other excess emissions were reported as provided in R 336.1912. If requested by the department, a person shall submit a full written report that includes the known causes, the corrective actions taken, and the preventive measures to be taken to minimize or eliminate the chance of recurrence.
  - (l) The actions during the period of excess emissions were documented by contemporaneous operating logs or other relevant evidence as provided by R 336.1912.
  - (m) Any information submitted to the department under this subrule shall be properly certified in accordance with the provisions of R 336.1912.
  - (4) A person may submit evidence to the department for its consideration in determining that the emission violations resulted from a start-up or shutdown. The evidence shall be based upon subrules (3)(b), (c), (e), (f), (i), (k), (l), and (m) of this rule; subdivisions (a), (b), (c) of this subrule; and R 336.1912, as applicable.
  - (a) The periods of excess emissions that occurred during start-up or shutdown were short and infrequent and could not have been prevented through careful planning and design.
  - (b) The excess emissions that occurred during start-up or shutdown were not part of a recurring pattern indicative of inadequate design, operation, or maintenance.
  - (c) The person responsible for operating the source of air contaminants has a preventative maintenance plan, consistent with the requirements set forth in R 336.1911(2)(a).
- (5) For an emission unit or units subject to standards and limitations promulgated pursuant to section 111 or 112 of the clean air act, the start-up, shutdown, or malfunction provisions of the applicable requirements within section 111 or 112 shall apply.
- (6) Nothing in this rule shall be construed to limit the authority of the department to seek injunctive relief or to enforce the provisions of the act and the regulations promulgated under the act.

History: 2002 MR 10, Eff. May 28, 2002.

**R 336.1916 Affirmative defense for excess emissions during start-up or shutdown.**

Rule 916. (1) The person operating a source with emissions in excess of an applicable emission limitation due to start-up or shutdown may claim an affirmative defense to an enforcement proceeding, excluding a judicial action seeking injunctive relief, if the person has complied with the reporting requirements of R 336.1912 and has demonstrated all of the following:

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- (a) The periods of excess emissions that occurred during start-up or shutdown were short and infrequent and could not have been prevented through careful planning and design.
  - (b) The excess emissions that occurred during start-up or shutdown were not part of a recurring pattern indicative of inadequate design, operation, or maintenance.
  - (c) The excess emissions caused by a bypass (an intentional diversion of control equipment) were unavoidable to prevent loss of life, personal injury, or severe property damage.
  - (d) The facility was operated at all times in a manner consistent with good practice for minimizing emissions.
  - (e) The frequency and duration of operating in start-up or shutdown mode were minimized to the maximum extent practicable.
  - (f) All reasonably possible steps were taken to minimize the impact of the excess emissions on ambient air quality.
  - (g) All emission monitoring systems were kept in operation if at all possible.
  - (h) The actions during the period of excess emissions were documented by contemporaneous operating logs or other relevant evidence as provided by R 336.1912.
  - (i) Excess emissions presenting an imminent threat to human health, safety, or the environment were reported to the department as soon as possible. Unless otherwise specified in the facility's permit, other excess emissions were reported as provided in R 336.1912. If requested by the department, a person shall submit a full written report that includes the known causes, the corrective actions taken, and the preventive measures to be taken to minimize or eliminate the chance of recurrence.
  - (j) Any information submitted to the department under this subrule shall be properly certified in accordance with the provisions of R 336.1912.
- (2) This affirmative defense does not apply when a single emission unit, or multiple emission units at a stationary source, causes an exceedance of the national ambient air quality standards or any applicable prevention of significant deterioration increment.
- (3) If the proximate cause of the excess emissions which occurred during routine start-up or shutdown periods was due to a malfunction, then, absent any intervening acts or superseding causes, the instances shall be treated as malfunctions in accordance with R 336.1915.
- (4) Nothing in this rule shall be construed to limit the authority of the department to seek injunctive relief or to enforce the provisions of the act and the regulations promulgated under the act.
- History: 2002 MR 10, Eff. May 28, 2002.

**R 336.1930 Emission of carbon monoxide from ferrous cupola operations.**

- Rule 930. (1) After December 31, 1982, it is unlawful for a person to operate a ferrous cupola that has a melting capacity of 20 or more tons per hour located within any area listed in table 91, unless the ferrous cupola is equipped with an afterburner control system, or equivalent, which reduces the carbon monoxide emissions from the ferrous cupola by 90%.
- (2) The emission rate of carbon monoxide from a ferrous cupola shall be determined by using reference test method 10, unless otherwise specified by the department.
- (3) A person responsible for the operation of a ferrous cupola subject to the provisions of this rule shall submit to the commission, within 6 months after the effective date of this rule, a written program, acceptable to the commission, for compliance with this rule or evidence of compliance with this rule. The evidence shall include available data, control equipment specifications, or other information that demonstrates compliance. The required control program shall demonstrate that compliance will be achieved as expeditiously as practical.
- (4) The program required by subrule (3) of this rule shall include the method by which compliance with this rule will be achieved, a complete description of new equipment to be installed, modifications to existing equipment to be made, and a timetable that specifies, at a minimum, all of the following dates:
- (a) The date equipment will be ordered.
  - (b) The date construction or modification of equipment will begin.
  - (c) The date initial start-up of equipment will begin.
  - (d) The date final compliance will be achieved, if not the same as the date specified in subdivision (c) of this subrule.

TABLE 91  
Areas subject to R 336.1930

<u>County</u>	<u>Area</u>
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Saginaw                    T12N, R4E, Sections 1, 12, 13, and 24;  
                              T12N, R5E, Sections 4, 9, and 16-21

Macomb,                    Area included within the following (counter-clockwise): Lake St. Clair to 14 Mile Road to  
Oakland,                and Kelly Road north to 15 Mile Road to Hayes Road south to 14 Mile Road to Clawson city  
Wayne                    boundary, following north Clawson city boundary to north Royal Oak city boundary to 13  
                              Mile Road to Evergreen Road to southern Beverly Hills city boundary to southern Bingham  
                              Farms city boundary to southern Franklin city boundary to Inkster Road to 8 Mile Road to  
                              western Livonia city boundary to western Westland city boundary to western Wayne city  
                              boundary to western and to southern Romulus city boundary including Pennsylvania Road  
                              extended to Detroit River.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1931 Standards for municipal solid waste landfills; adoption of standards by reference.**

Rule 931. (1) The provisions of 40 C.F.R. part 60, subpart Cc, §§60.30c to 60.36c (2000), are adopted by reference in these rules. The owner or operator responsible for the operation of a municipal solid waste landfill that is subject to the provisions of 40 C.F.R. part 60, subpart Cc, §§60.30c to 60.36c (2000), entitled “emission guidelines and compliance schedules for municipal solid waste landfills,” shall comply with the provisions of 40 C.F.R. part 60, subpart Cc, §§60.30c to 60.36c (2000), and shall comply with the following schedule for increments of compliance, as specified in 40 C.F.R. part 60, subpart Cc, §60.36c, where applicable:

(a) Within 90 days of the date of approval of the state plan by the United States environmental protection agency, submit a design capacity report to the department.

(b) Within 90 days of the date of approval of the state plan by the United States environmental protection agency, submit the first annual emission rate report if the design capacity of the landfill is equal to or greater than 2.5 million megagrams and 2.5 million cubic meters. Subsequent annual emission rate reports shall be submitted to the department by March 15 of the following calendar year. Alternate 5-year emission reports allowed by 40 C.F.R. part 60, subpart WWW, §60.757 shall be submitted by March 15 of the appropriate calendar year.

(c) Within 12 months of the submittal of the annual emission rate report which first shows that the nonmethane organic compound emission rate is equal to or greater than 50 megagrams per year, submit the final site-specific collection and control system design plan to the department.

(d) Within 30 months of the submittal of the annual or alternate 5-year emission rate report which first shows that the nonmethane organic compound emission rate is equal to or greater than 50 megagrams per year, complete on-site construction or installation of the gas collection and control system and start-up operation of gas collection and control system.

(e) Within 180 days of the completion of the on-site construction or installation of the gas collection and control system as specified in subdivision (d) of this subrule, conduct the initial performance test of the gas collection and control system, for systems other than utility flares. Utility flares shall meet the requirements of 40 C.F.R. part 60, subpart A, §60.18(b).

(f) Within 60 days of conducting the initial performance test as specified in subdivision (e) of this subrule, submit a copy of the performance test results to the department.

(2) Alternate compliance schedules may be submitted to the department and the environmental protection agency on a case-by-case basis for approval. An alternate compliance schedule shall meet 1 or more of the following criteria for approval, as stated in 40 C.F.R. part 60, subpart B, §60.24(f):

(a) Unreasonable cost of control resulting from landfill age, location, or basic design.

(b) Physical impossibility of installing necessary control equipment.

(c) Other factors specific to the landfill that make application of a less stringent compliance time significantly more reasonable.

(3) A copy of 40 C.F.R. part 60, subparts B and Cc, (2000), is available for inspection and purchase at the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at a cost as of the time of adoption of these rules of \$66.00. Copies may also be obtained from the Superintendent of Documents, Government Printing Office, P.O. Box 371954, Pittsburgh, Pennsylvania 15250-7954, at a cost as of the time of adoption of these rules of \$66.00, or on the United States government printing office internet web site at <http://www.access.gpo.gov>.

History: 1999 MR 1, Eff. Feb. 4, 1999; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1932 Standards for municipal solid waste combusters; adoption of standards by reference.**

Rule 932. (1) The provisions of 40 C.F.R. part 60, subpart Cb, §§60.30b to 60.39b (2000), are adopted by reference in these

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rules. The owner or operator of a large municipal waste combustor unit or units subject to the provisions of 40 C.F.R. part 60, subpart Cb, §§60.30b to 60.39b (2000), entitled “emissions guidelines and compliance schedules for municipal waste combustors,” shall comply with the provisions of 40 C.F.R. part 60, subpart Cb, §§60.30b to 60.39b (2000), and shall comply with all of the following compliance schedules, where applicable:

(a) The owner or operator of a large municipal waste combustor unit or units at a facility for which construction commenced after September 1987 and before September 20, 1994, shall comply with the following compliance schedule for controlling mercury and dioxin/furan emissions at the unit or units:

(i) By March 1, 1999, or within 6 months after the issuance of a permit to install, whichever is later, submit a final control plan to the department.

(ii) By March 1, 1999, or within 6 months after the issuance of a permit to install, whichever is later, award the contract for control systems or process modifications or purchase orders for components.

(iii) By June 1, 1999, or within 9 months after the issuance of a permit to install, whichever is later, initiate on-site construction or installation of control equipment or process changes.

(iv) By August 1, 1999, or within 11 months after the issuance of a permit to install, whichever is later, complete on-site construction of control equipment or process changes.

(v) By September 1, 1999, or within 12 months after the issuance of a permit to install, whichever is later, complete retrofit and start-up operation of equipment.

(vi) Within 180 days after completion of retrofit as specified in paragraph (v) of this subdivision, conduct final performance tests.

(vii) Within 90 days after conducting final performance tests as specified in paragraph (vi) of this subdivision, submit performance test results to the department.

(b) The owner or operator of a large municipal waste combustor unit or units at a facility for which construction commenced before September 20, 1994, shall comply with the following compliance schedule for the control of carbon monoxide, particulate matter, cadmium, lead, sulfur dioxide, hydrochloric acid, and oxides of nitrogen emissions at the unit or units:

(i) By March 1, 1999, or within 6 months after the effective date of this rule, whichever is earlier, submit a final control plan to the department.

(ii) By September 1, 1999, or within 12 months after the effective date of this rule, whichever is earlier, award contracts for control systems or process modifications or orders for the purchase of components.

(iii) By December 1, 1999, or within 18 months after the effective date of this rule, whichever is earlier, initiate on-site construction or installation of the air pollution control equipment or process changes.

(iv) By November 19, 2000, or within 24 months after the effective date of this rule, whichever is earlier, complete on-site construction or installation of control equipment or process changes.

(v) By December 19, 2000, start up the air pollution control equipment for the unit or units or cease operations of the unit or units until the retrofit of the unit or units is complete.

(vi) Within 180 days after completion of retrofit and start-up of operations as specified in paragraph (v) of this subdivision, conduct a final performance test.

(vii) Within 90 days after conducting the final performance test as specified in paragraph (vi) of this subdivision, submit performance test results to the department.

(c) The owner or operator of a municipal waste combustor unit or units at a facility to which the provisions of 40 C.F.R. §60.39b(c)(1)(ii) of subpart Cb apply shall permanently cease operations not later than December 19, 2000. A written closure agreement shall be submitted to the department before the closure date and shall include the calendar date on which operations of the unit or units will permanently cease and data from dioxin/furan emission tests in accordance with 40 C.F.R. §60.39b(c)(2) of subpart Cb.

(2) In accordance with the emission averaging and emission reduction credit trading rules, being R 336.2201 et seq., an owner or operator of a large municipal waste combustor unit or units may engage in air emission trading for oxides of nitrogen emissions.

(3) A copy of 40 C.F.R. part 60, subpart Cb, §§60.30b to 60.39b (2000), is available for inspection and purchase at the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at a cost as of the time of adoption of these rules of \$66.00. Copies may also be obtained from the Superintendent of Documents, Government Printing Office, P.O. Box 371954, Pittsburgh, Pennsylvania, 15250-7954, at a cost as of the time of adoption of this rule of \$66.00, or on the United States government printing office internet web site at <http://www.access.gpo.gov>.

History: 1999 MR 1, Eff. Feb. 4, 1999; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.1933**

**Source:** 1998-2000 AACs.



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**R 336.1940**

**Source:** 1998-2000 AACs.

**R 336.1941**

**Source:** 1998-2000 AACs.

**R 336.1942**

**Source:** 1998-2000 AACs.

**PART 10. INTERMITTENT TESTING AND SAMPLING**

**R 336.2001 Performance tests by owner.**

Rule 1001. (1) The department may require the owner or operator of any source of air contaminant to conduct acceptable performance tests, at the owner's or operator's expense, in accordance with R 336.2003 under any 1 of the following conditions:

- (a) Prior to issuance of a permit to operate.
  - (b) The source is determined to be in violation of R 336.1301 and the potential emissions exceed 100 tons per year.
  - (c) The owner or operator of the source has not submitted an acceptable performance test, in accordance with R 336.2003, that demonstrates that the source is in compliance with the department's rules and with the conditions specified in the permit to install.
  - (d) The source of air contaminant is located in an area designated as nonattainment for 1 or more air pollutants, and more than 12 months have expired since the date of the last performance test for such designated nonattainment pollutants.
  - (e) The source of air contaminant has potential emissions in excess of 100 tons per year, is located in an area designated as attainment for 1 or more air pollutants, and more than 36 months have expired since the date of the last performance test for such designated attainment pollutants.
  - (f) After completion of a compliance program.
- (2) Performance tests required by subrule (1) of this rule shall be conducted within 60 days following receipt of written notification from the department, unless otherwise authorized by the department.
- (3) Not less than 7 days before performance tests are conducted, the owner of a source of air contaminant, or his or her authorized agent, shall notify the department, in writing, of the time and place of the performance tests and who shall conduct them. A representative of the department shall have the opportunity to witness these tests.
- (4) Results of performance tests shall be submitted to the department in the format prescribed by the applicable reference test method within 60 days after the last date of the test.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2002 Performance tests by department.**

Rule 1002. (1) The department may conduct performance tests in accordance with R 336.2003 at any source of air contaminant, on behalf of the state, at a reasonable time and at the state's expense. During the conduct of such tests, the department may obtain samples of any air contaminant and samples of any material entering or exiting the source or air-cleaning device for the purpose of evaluating pollutant emissions with respect to process operating conditions.

(2) The department shall provide written notification to the owner or operator of a source of the department's intent to conduct performance tests pursuant to subrule (1). Within 30 days of receipt of such notification, the owner or operator shall provide, and bear the expense of, performance test facilities as specified by the department, including the following:

- (a) Sampling ports adequate for reference test methods applicable to the source.
- (b) Safe sampling platforms as required.
- (c) Safe access to sampling platforms.
- (d) A suitable power source within 50 feet of any sampling location designated by the department.

Upon request, additional time for installing the required performance test facilities may be authorized by the department for special situations.

(3) The owner shall not be responsible for providing sampling instruments and sensing devices.

(4) Results of performance tests shall be furnished to the owner or operator, or both, in the format prescribed by the applicable reference test method within 60 days following the last date of the test.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2003 Performance test criteria.**

Rule 1003. (1) Performance tests shall be conducted and data reduced according to the reference test methods listed in R

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336.2004, unless the department does any of the following:

- (a) Specifies or approves, in specific cases, the use of a reference test method with minor changes in procedures or equipment.
- (b) Approves the use of an equivalent method.
- (c) Specifies or approves the use of an alternative method if an applicable reference test method does not exist for a specific air contaminant or source of air contaminant.
- (2) A performance test shall consist of a minimum of 3 separate samples of a specific air contaminant conducted within a 36-hour period, unless otherwise authorized by the department. Each of the 3 separate samples shall be obtained while the source is operating at a similar production level. For the purpose of determining compliance with an applicable emission limit, rule, or permit condition, the arithmetic mean of results of the 3 samples shall apply. If a sample is accidentally lost or conditions occur in which 1 of the 3 samples must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sampling train, extreme meteorological conditions, or other circumstances beyond the owner's or operator's control, then compliance may, upon the approval of the department, be determined using the arithmetic mean of the results of 2 samples.
- (3) All performance tests shall be conducted while the source of air contaminant is operating at maximum routine operating conditions, or under such other conditions, within the capacity of the equipment, as may be requested by the department. Other conditions may include source operating periods of start-up, shutdown, or such other operations, excluding malfunction, specific to certain sources. Routine operating conditions shall also include those specified within a permit to install or a permit to operate. The owner or operator shall make available to the department such records as may be necessary to determine the conditions of source operation that occurred during the period of time of the performance test.
- (4) For any source that is subject to an emission limitation calculated to 50% excess air, the multipoint, integrated sampling procedure of method 3 shall be used for gas analysis. For all other sources that require a determination of the molecular weight of the exhaust, any optional sampling procedure of method 3 may be used. Alternatives or modifications to procedures are subject to the approval of the department.
- (5) For reference test methods 5B and 5C, the minimum volume per sample shall be 30 cubic feet of dry gas corrected to standard conditions (70 degrees Fahrenheit, 29.92 in. Hg.). Minimum sample time shall be 60 minutes, which may be continuous or a combination of shorter sampling periods for sources that operate in a cyclic manner. Smaller sampling times or sample volumes, when necessitated by process variables or other factors, may be approved by the department.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2004 Appendix A; reference test methods; adoption of federal reference test methods.**

Rule 1004. (1) The following federal reference test methods, described in the provisions of 40 C.F.R. part 60, appendix A (2000), are the reference test methods for performance tests required pursuant to the provisions of this part:

- (a) Method 1 - Sample and velocity traverse for stationary sources.
- (b) Method 1A - Sample and velocity traverses for stationary sources with small stacks or ducts.
- (c) Method 2 - Determination of stack gas velocity and volumetric flow rate (type-S pitot tube).
- (d) Method 2A - Direct measurement of gas volume through pipes and small ducts.
- (e) Method 2C - Determination of stack gas velocity and volumetric flow rate in small stacks and ducts (standard pitot tube).
- (f) Method 2D - Measurement of gas volumetric flow rates in small pipes and ducts.
- (g) Method 3 - Gas analysis for the determination of dry molecular weight.
- (h) Method 4 - Determination of moisture content in stack gases.
- (i) Method 6 - Determination of sulfur dioxide emissions from stationary sources.
- (j) Method 7 - Determination of nitrogen oxide emissions from stationary sources.
- (k) Method 8 - Determination of sulfuric acid mist and sulfur dioxide emissions from stationary sources.
- (l) Method 9 - Visual determination of the opacity of emissions from stationary sources.
- (m) Method 10 - Determination of carbon monoxide emissions from stationary sources.
- (n) Method 10B - Determination of carbon monoxide emissions from stationary sources.
- (o) Method 18 - Measurement of gaseous organic compound emissions by gas chromatography.
- (p) Method 21 - Determination of volatile organic compound leaks.
- (q) Method 24 - Determination of volatile matter content, water content, density, volume solids and weight solids of surface coatings.
- (r) Method 24A - Determination of volatile matter content and density of printing inks and related coatings.
- (s) Method 25 - Determination of total gaseous nonmethane organic emissions as carbon.
- (t) Method 25A - Determination of total gaseous organic concentration using a flame ionization analyzer.

(2) The reference test methods listed in subrule (1) of this rule are adopted by reference in this rule. Copies of the test methods may be inspected at the Lansing office of the air quality division of the department of environmental quality. A copy of title 40 of the Code of Federal Regulations, part 60, appendix A, may be obtained from the Department of Environmental

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Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760; from the Superintendent of Documents, United States Government Printing Office, P.O. Box 371954, Pittsburgh, Pennsylvania 15250-7954, at a cost at the time of adoption of these rules of \$66.00; or on the United States government printing office internet web site at <http://www.access.gpo.gov>.

(3) All alternatives that are subject to the approval of the administrator in the adopted federal reference methods are subject to the approval of the department.

(4) Determinations of compliance with visible emission standards for stationary sources shall be conducted as specified in reference test method 9 or other alternative method approved by the department, with the following exceptions:

(a) Visible emissions from a scarfing operation at a steel manufacturing facility shall be determined as specified in reference test method 9A, which is described in R 336.2030.

(b) Visible emissions from a coke oven pushing operation and fugitive coke oven visible emissions shall be determined as specified in reference test method 9B, which is described in R 336.2031.

(c) Visible emissions, fugitive and nonfugitive, from basic oxygen furnace operations, hot metal transfer operations, and hot metal desulfurization operations shall be determined as specified in reference method 9C, which is described in R 336.2032.

(5) Determinations of particulate emission rates for stationary sources shall be conducted as specified in 1 or more of the following reference test methods:

(a) Reference test method 5B, which is described in R 336.2011.

(b) Reference test method 5C, which is described in R 336.2012.

(c) Reference test method 5D, which is described in R 336.2013.

(d) Reference test method 5E, which is described in R 336.2014.

(e) "Standard Methods for the Examination of Water and Wastewater," (14th edition), section 208C, as described and modified in R 336.2033.

(6) Determinations of total gaseous nonmethane organic emissions as carbon, using the alternate version of federal reference test method 25 incorporating the Byron analysis, shall be conducted as specified in R 336.2006.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1985 MR 2, Eff. Feb. 22, 1985; 1989 MR 4, Eff. Apr. 19, 1989; 1993 MR 4, Eff. Apr. 28, 1993; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2005 Reference test methods for delivery vessels.**

Rule 1005. (1) The following reference test method shall be used to pressure and vacuum test delivery vessel tanks for vaportightness:

(a) Principle. Pressure and vacuum are applied to the compartments of gasoline delivery vessel tanks and the change in pressure vacuum is recorded after a specified period of time.

(b) Applicability. This method is applicable to determining the leak tightness of gasoline delivery vessel tanks in use and equipped with vapor collection equipment.

(c) Apparatus. The following apparatus shall be used:

(i) Pressure source. Pump or compressed gas cylinder of air or inert gas sufficient to pressurize the delivery vessel tank to 0.9 pounds per square inch (24.9 inches of water) above atmospheric pressure.

(ii) Regulator. Low-pressure regulator for controlling pressurization of the delivery vessel tank.

(iii) Vacuum source. Vacuum pump capable of evacuating the delivery vessel tank to 0.4 pounds per square inch (11.1 inches of water) below atmospheric pressure.

(iv) Manometer. Liquid manometer, or equivalent, capable of measuring up to 0.9 pounds per square inch (24.9 inches of water) gauge pressure within 0.003 pounds per square inch (0.1 inches of water) precision.

(v) Test cap for vapor recovery hose fittings. This cap shall have a tap for manometer connection and a fitting with a shutoff valve for connection to the pressure (vacuum) supply hose.

(vi) Pressure (vacuum) relief valves. The test apparatus shall be equipped with an in-line pressure (vacuum) relief valve set to activate at 1 pound per square inch (27.7 inches of water) above atmospheric pressure or 0.4 pounds per square inch (11.1 inches of water) below atmospheric pressure, with a capacity equal to the pressurizing or evacuating pumps.

(vii) Caps for liquid delivery line.

(viii) Pressure (vacuum) supply hose.

(d) Pretest conditions. Both of the following pretest conditions shall be complied with:

(i) Purging of vapor. The delivery vessel tank shall be purged of gasoline vapors and tested empty. The tank may be purged by any safe method, such as flushing with diesel fuel or heating fuel.

(ii) Location. The delivery vessel tank shall be tested where it will be protected from direct sunlight.

(e) Test procedure. The following test procedure shall be complied with:

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- (i) The dome covers are to be opened and then closed.
- (ii) Connect static electrical ground connections to the tank. Attach the delivery and vapor hoses, remove the delivery elbows, and plug the liquid delivery fittings.
- (iii) Attach the test cap to the vapor recovery line of the delivery vessel tank.
- (iv) Connect compartments of the tank internally to each other if possible. If not possible, each compartment shall be tested separately.
- (v) Connect the pressure (vacuum) supply hose and the pressure (vacuum) relief valve to the shutoff valve. Attach the pressure source to the hose. Attach a manometer to the pressure tap.
- (vi) Open the shutoff valve in the vapor recovery hose cap. Applying air pressure slowly, pressurize the tank or, alternatively, the first compartment to 0.6 pounds per square inch (16.6 inches of water) above atmospheric pressure.
- (vii) Close the shutoff valve and allow the pressure in the delivery vessel tank to stabilize, adjusting the pressure if necessary to maintain 0.6 pounds per square inch (16.6 inches of water) above atmospheric pressure. When the pressure stabilizes, record the time and initial pressure.
- (viii) At the end of 5 minutes, record the time and final pressure.
- (ix) Disconnect the pressure source from the pressure (vacuum) supply hose, and slowly open the shutoff valve to bring the tank to atmospheric pressure.
- (x) Connect the vacuum source to the pressure (vacuum) supply hose.
- (xi) Slowly evacuate the tank or, alternatively, the first compartment to 0.2 pounds per square inch (5.5 inches of water) below atmospheric pressure.
- (xii) Close the shutoff valve and allow the pressure in the delivery vessel tank to stabilize, adjusting the pressure if necessary to maintain 0.2 pounds per square inch (5.5 inches of water) below atmospheric pressure. When the pressure stabilizes, record the time and initial pressure.
- (xiii) At the end of 5 minutes, record the time and final pressure.
- (xiv) Repeat the procedures in paragraphs (v) to (xiii) of this subdivision for each compartment if they were not interconnected.
- (f) Alternative test methods. Techniques or apparatus other than those specified in subdivisions (c) to (e) of this subrule may be used for purging and pressurizing the delivery vessel tanks, if prior approval is obtained from the department. Such approval will be based upon demonstrated equivalency to the method specified in this subrule.
- (2) The following reference test method shall be used to detect gasoline vapor leaks by a combustible gas detector:
  - (a) Principle. A combustible gas detector is used to indicate any incidence of leakage from gasoline delivery vessel tanks and vapor control systems. This qualitative monitoring procedure is an enforcement tool to confirm the continuing existence of leak-tight conditions.
  - (b) Applicability. This method is applicable to determining leak-tightness of gasoline delivery vessel tanks during loading without taking the delivery vessel tank out of service. The method is applicable only if the vapor control system does not create back pressure in excess of the pressure limits of the delivery vessel tank compliance leak test. For vapor control systems, this method is applicable to determining leak-tightness at any time.
  - (c) Apparatus and specifications. The following apparatus shall be used:
    - (i) Manometer. Liquid manometer, or equivalent, capable of measuring up to 0.9 pounds per square inch (24.9 inches of water) gauge pressure within 0.003 pounds per square inch (0.1 inches of water) precision.
    - (ii) Combustible gas detector. A portable hydrocarbon gas analyzer with associated sampling line and probe which complies with all of the following provisions:
      - (A) Safety. The device is certified as safe for operation in explosive atmospheres.
      - (B) Range. The device shall have a minimum range of 0 to 100% of the lower explosive limit (LEL) as propane.
      - (C) Probe diameter. The sampling probe shall have an internal diameter of 0.625 centimeters (1/4 inch).
      - (D) Probe length. The probe sampling line shall be of sufficient length for easy maneuverability during testing.
      - (E) Response time. The response time for full-scale deflection shall be less than 8 seconds for a detector with a sampling line and probe attached.
  - (d) Test procedure. The following test procedure shall be complied with:
    - (i) Pressure. Place a pressure tap in the terminal, plant, or service station vapor control system as close as possible to the connection with the delivery vessel tank. Record the pressure periodically during testing.
    - (ii) Calibration. Calibrate the combustible gas detector with 2.2% propane, by volume, in air for 100% lower explosive limit response.
    - (iii) Monitoring procedure. During loading or unloading, check the periphery of all potential sources of leakage of the delivery vessel tank and of the terminal, plant, or service station vapor collection system with a combustible gas detector. The check shall comply with the following procedure:
      - (A) Probe distance. The probe inlet shall be 2.5 centimeters from the potential leak source.

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(B) Probe movement. Move the probe slowly (2.0 centimeters per second). If there is any meter deflection at a potential leak source, move the probe to locate the point of highest meter response.

(C) Probe position. As much as possible, the probe inlet shall be positioned in the path of (parallel to) the vapor flow from a leak.

(D) Wind. Attempt, as much as possible, to block the wind from the area being monitored.

(iv) Recording. Record the highest detector reading and location for each incidence of leakage.

History: 1979 ACS 7, Eff. Aug. 22, 1981; 1989 MR 4, Eff. Apr. 20, 1989; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2006**

**Source:** 1993 AACS.

**R 336.2007 Alternate version of procedure L, referenced in R 336.2040(10).**

Rule 1007. (1) The alternate version of procedure L is as follows:

1. Introduction.

1.1 Applicability. This procedure is applicable for determining the input of volatile organic compounds (voc), measured as equivalent propane as measured by a flame ionization instrument. It is intended to be used as a segment in the development of liquid/gas protocols for determining voc capture efficiency (ce) for surface coating and printing operations.

1.2 Principle. The amount of voc introduced to the process (I) is the sum of products of the weight (w) of each voc containing liquid (ink, paint, solvent, or similar material) used and its voc content (v), corrected for a response factor (rf) to allow the input to be calculated in terms of propane, the same calibration gas used in the gaseous voc measurements. A sample of each coating used is distilled to separate the voc fraction. The distillate is used to prepare a known standard for analysis by a flame ionization analyzer (fia), calibrated against propane, to determine its rf.

2. Apparatus and reagents.

2.1 Liquid weight.

2.1.1 Balances/digital scales. To weigh drums of voc containing liquids to within 0.2 lb.

2.1.2 Volume measurement apparatus (alternative). Volume meters, flow meters, density measurement equipment, or similar material, as needed to achieve the same accuracy as direct weight measurements.

2.2 Response factor (rf) determination (fia technique). The voc distillation and tedlar gas bag generation systems apparatus are shown in figures 1 and 2. The following equipment is required:

2.2.1 Sample collection can. An appropriately sized metal can to collect voc-containing materials. The can shall be constructed in such a way that it can be grounded to the coating container.

2.2.2 Needle valves. To control gas flow.

2.2.3 Regulators. For fia, calibration, dilution, and sweep gas cylinders.

2.2.4 Tubing and fittings. Teflon and stainless steel tubing and fittings with diameters and lengths and sizes determined by connection requirements of the equipment.

2.2.5 Thermometer. Capable of measuring the temperature of the hot water and oil baths to within 1 degree Celsius.

2.2.6 Analytical balance. To measure plus or minus 0.01 mg.

2.2.7 Microliter syringe. 10-microliter size.

2.2.8 Vacuum and pressure manometers. 0 to 760 mm (0 to 30 in.) hg. U-tube manometer, vacuum or pressure.

2.2.9 Hot oil bath, with stirring hot plate. Capable of heating and maintaining a distillation vessel at 110 plus or minus 3 degrees Celsius.

2.2.10 Vacuum/water aspirator. A device capable of drawing a vacuum to within 20 mm hg from absolute.

2.2.11 Rotary evaporator system. Complete with folded inner coil, vertical style condenser, rotary speed control, and teflon sweep gas delivery tube with valved inlet. Buchi rotavapor or equivalent.

2.2.12 Ethylene glycol cooling/circulating bath. Capable of maintaining the condenser coil fluid at minus 10 degrees Celsius.

2.2.13 Dry gas meter. For the precise measurement of dilution gas volume. It shall be calibrated to a primary standard, either spirometer or bubble meter.

2.2.14 Activated charcoal/mole sieve trap. To remove any trace level of organics picked up from the dry gas meter.

2.2.15 Gas coil heater. Sufficient length of 0.125-inch stainless steel tubing to allow heating of the dilution gas to near the water bath temperature before entering the volatilization vessel.

2.2.16 Water bath, with stirring hot plate. Capable of heating and maintaining a volatilization vessel and coil heater at a temperature of 100 plus or minus 5 degrees Celsius.

2.2.17 Volatilization vessel. 50-milliliter midget impinger fitted with a septum top and loosely filled with glass wool to increase volatilization surface.

2.2.18 Tedlar gas bag. Capable of holding 30 liters of gas, flushed clean with zero air, leak tested and evacuated.

2.2.19 Cylinder of compressed zero air. Used to supply dilution air for making the tedlar bag gas samples.

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2.2.20 Cylinder of compressed the free  $n_2$ . Used as sweep gas in the rotary evaporator system.

2.2.21 Organic concentration analyzer. An fia with a span value of 1.5 times the expected concentration as propane; however, other span values may be used if it can be demonstrated that they would provide more accurate measurements. The fia instrument shall be the same instrument used in the gaseous analyses adjusted with the same fuel, combustion air, and sample backpressure (flowrate) settings. The system shall be capable of meeting or exceeding the following specifications:

2.2.21.1 Zero drift. Less than plus or minus 3.0% of the span value.

2.2.21.2 Calibration drift. Less than plus or minus 3.0% of span value.

2.2.21.3 Calibration error. Less than plus or minus 5.0% of the calibration gas value.

2.2.22 Integrator/data acquisition system. An analog or digital device or computerized data acquisition system used to integrate the fia response or compute the average response and record measurement data. The minimum data sampling frequency for computing average or integrated values is 1 measurement value every 5 seconds. The device shall be capable of recording average values at least once per minute.

2.2.23 Chart recorder (optional). A chart recorder or similar device is recommended to provide a continuous analog display of the measurement results during the liquid sample analysis.

2.2.24 Calibration and other gases. For calibration, fuel, and combustion air, if required, contained in compressed gas cylinders. All calibration gases shall be traceable to NIST standards and shall be certified by the manufacturer to plus or minus 1% of the tag value. Additionally, the manufacturer of the cylinder should provide a recommended shelf life for each calibration gas cylinder over which the concentration does not change more than plus or minus 2% from the certified value. For calibration gas values that are not generally available, alternative methods for preparing calibration gas mixtures, such as dilution systems, may be used with prior approval.

2.2.24.1 Fuel. 99.995% hydrogen, 40% hydrogen/60% helium, or 40% hydrogen/ 60% nitrogen. The fia manufacturer's recommended fuel shall be used. An attempt shall be made to avoid fuels with oxygen to avoid an oxygen synergism effect that reportedly occurs when oxygen concentration varies significantly from a mean value.

2.2.24.2 Carrier gas. High purity air with less than 1 ppm of organic material (as propane) or less than 0.1% of the span value, whichever is greater.

2.2.24.3 Fia linearity calibration gases. Low-, mid-, and high-range gas mixture standards with a nominal propane concentration of 20 to 30, 45 to 55, and 70 to 80% of the span value in air, respectively. Other calibration values and other span values may be used if it can be shown that more accurate measurements would be achieved.

2.2.24.4 System calibration gas. Gas mixture standard which contains propane in air and which approximates the voc concentration expected for the tedlar gas bag samples.

3. Determination of liquid input weight. A capture efficiency test shall consist of not less than 3 sampling runs. Each run shall cover at least 1 complete production or processing cycle or shall be at least 1 hour in duration. For automotive surface coating operations, the sampling time per run shall be based on coating a minimum of 3 representative vehicles.

3.1 Weight difference. Determine the amount of material introduced to the process as the weight difference of the feed material before and after each sampling run. In determining the total voc-containing liquid usage, account for all of the following:

(a) The initial (beginning) voc-containing liquid mixture.

(b) Any solvent added during the test run.

(c) Any coating added during the test run.

(d) Any residual voc-containing liquid mixture remaining at the end of the sample run.

3.1.1 Identify all points where voc-containing liquids are introduced to the process. To obtain an accurate measurement of voc-containing liquids, start with an empty fountain, if applicable. After completing the run, drain the liquid in the fountain back into the liquid drum, if possible, and weigh the drum again. Weigh the voc-containing liquids to plus or minus 0.5% of the total weight (full) or plus or minus 0.1% of the total weight of voc-containing liquid used during the sample run, whichever is less. If the residual liquid cannot be returned to the drum, drain the fountain into a preweighed empty drum to determine the final weight of the liquid.

3.1.2 If it is not possible to measure a single representative mixture, then weigh the various components separately, for example, if solvent is added during the sampling run, weigh the solvent before it is added to the mixture. If a fresh drum of voc-containing liquid is needed during the run, then weigh both the empty drum and the fresh drum.

3.2 Volume measurement (alternative). If direct weight measurements are not feasible, the tester may use volume meters, flow rate meters, and density measurements to determine the weight of liquids that are used if it can be demonstrated that the technique produces results equivalent to the direct weight measurements. If a single representative mixture cannot be measured, measure the components separately.

4. Determination of voc content in input liquids.

4.1 Collection of liquid samples.

4.1.1 Collect a 1-pint or larger sample of the voc-containing liquid mixture at each application location at the beginning and end of each test run. A separate sample shall be taken of each voc-containing liquid that is added to the application mixture during

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the test run. If a fresh drum is needed during the sampling run, then obtain a sample from the fresh drum.

4.1.2 When collecting the sample, ground the sample container to the coating drum. Fill the sample container as close to the rim as possible to minimize the amount of headspace.

4.1.3 After the sample is collected, seal the container so the sample cannot leak out or evaporate.

4.1.4 Label the container to identify clearly the contents.

4.2 Distillation of voc.

4.2.1 Assemble the rotary evaporator as shown in figure 1.

4.2.2 Leak check the rotary evaporation system by aspirating a vacuum of approximately 20 mm hg from absolute. Close up the system and monitor the vacuum for approximately 1 minute. If the vacuum falls more than 125 mm hg in 1 minute, repair leaks and repeat.

4.2.3 Deposit approximately 20 mls of the sample (inks, paints, or similar material) into the rotary evaporation distillation vessel.

4.2.4 Turn off the aspirator and gradually apply a vacuum to the evaporator of within 20 mm hg.

4.2.5 Begin heating the vessel at a rate of 2 to 3 degrees Centigrade per minute, maintaining the vacuum specified in 4.2.3. Care shall be taken to prevent material bumping from the distillation flask.

4.2.6 Continue heating until a temperature of 110 degrees Centigrade is achieved and maintain this temperature for not less than 10 minutes or until the sample has dried in the distillation flask.

4.2.7 Slowly introduce the  $n_2$  sweep gas through the purge tube and into the distillation flask, taking care to maintain not less than 125 mm hg vacuum at all times.

4.2.8 Continue sweeping the remaining solvent voc from the distillation flask and condenser assembly for 10 minutes or until all traces of condensed solvent are gone from the vessel and the still head.

4.2.9 Disassemble the apparatus and transfer the distillate to a labeled sealed vial.

4.3 Preparation of voc standard bag sample.

4.3.1 Assemble the bag sample generation system as shown in figure 2 and bring the water bath up to a near-boiling temperature.

4.3.2 Inflate the tedlar bag and perform a leak check on the bag.

4.3.3 Evacuate the bag and close the bag inlet valve.

4.3.4 Record the current barometric pressure.

4.3.5 Record the starting reading on the dry gas meter, open the bag inlet valve, and start the dilution zero air flowing into the tedlar bag at approximately 2 liters per minute.

4.3.6 The bag sample voc concentration shall be similar to the gaseous voc concentration measured in the exhaust gas ducts. The amount of liquid voc required can be approximated using the equations in section 6, the gaseous voc measurement results in terms of propane, and an assumed response factor of 1.0. Let  $c_{e3}$  equal the exhaust gas concentration in terms of propane and  $rf=1.0$ . Calculate  $c_{voc}$ . Let  $b_v = 20$  liters and calculate  $m_l$ , the approximate quantity of liquid to be used to prepare the bag gas sample.

4.3.7 Quickly withdraw an aliquot (approximately 5 microliters) of sample from the distillate vial with the microliter syringe and record its weight from the analytical balance to the nearest 0.01 Mg.

4.3.8 Inject the contents of the syringe through the septum of the volatilization vessel into the glass wool inside the vessel.

Reweigh and record the tare weight of the now empty syringe.

4.3.10 Record the pressure and temperature of the dilution gas as it is passed through the dry gas meter, as shown in the figure 2 diagram.

4.3.11 After approximately 20 liters of dilution gas have passed into the tedlar bag, close the valve to the dilution air source and record the exact final reading on the dry gas meter.

4.3.12 The gas bag is then analyzed by fia within 1 hour of bag preparation in accordance with the procedures contained in section 4.4.

4.4 Determination of voc response factor.

4.4.1 Start up the fia instrument using the same settings as used for the gaseous voc measurements.

4.4.2 Perform the fia analyzer calibration and linearity checks according to the procedure in section 5.1. Record the responses to each of the calibration gases and the back-pressure setting of the fia.

4.4.3 Connect the tedlar bag sample to the fia sample inlet and record the bag concentration in terms of propane. Continue the analysis until a steady reading is obtained for not less than 30 seconds. Record the final reading and proceed with the calculation of the response factor.

4.5 Determination of coating voc content as voc ( $v_u$ ).

4.5.1 Determine the voc content of the coatings used in the process using EPA method 24 or 24a as applicable.

5. Calibration and quality assurance.

5.1 Fia calibration and linearity check. Make necessary adjustments to the air and fuel supplies for the fia and ignite the burner. Allow the fia to warm up for the period recommended by the manufacturer. Inject a calibration gas into the measurement system and adjust the back-pressure regulator to the value required to achieve the flow rates specified by the manufacturer. Inject the

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zero- and the high-range calibration gases and adjust the analyzer calibration to provide the proper responses. Inject the low- and mid-range gases and record the responses of the measurement system. The calibration and linearity of the system are acceptable if the responses for all 4 gases are within 5% of the respective gas values. If the performance of the system is not acceptable, repair or adjust the system and repeat the linearity check. Conduct a calibration and linearity check after assembling the analysis system and after a major change is made to the system. A calibration curve consisting of zero gas and 2 calibration levels shall be performed at the beginning and end of each batch of samples.

5.2 Systems drift checks. After each sample, repeat the system calibration checks in section 5.1 before any adjustments to the fia or measurement system are made. If the zero or calibration drift is more than plus or minus 3% of the span value, discard the result and repeat the analysis.

5.3 Quality control. A minimum of 1 sample in each batch shall be distilled and analyzed in duplicate as a precision control. If the results of the 2 analyzed differ by more than plus or minus 10% of the mean, then the system shall be reevaluated and the entire batch shall be redistilled and analyzed.

## 6. Calculations.

6.1 Bag sample volume,  $B_v$ .

$$B_v = \frac{(M_v)(T_{STD})(P_M)}{(T_M)(P_{STD})}$$

Where:

$B_v$  = Bag sample volume in standard liters.

$M_v$  = Indicated dry gas meter volume, in liters.

$T_{STD}$  = 293°K.

$T_M$  = Meter gas temperature, in °K.

$P_M$  = Meter gas pressure, in mm Hg absolute.

$P_{STD}$  = 760 mm Hg.

6.2 Bag sample voc concentration, as voc,  $C_{voc}$ .

$$C_{voc} = M_l/B_v$$

Where:

$C_{voc}$  = Bag sample voc concentration, as voc, mg/std. liters.

$M_l$  = Weight of voc liquid injected, mg.

6.3 Bag sample voc concentration, as propane,  $C_{c3}$ .

$$C_{c3} = R_{c3} * K$$

Where:

$C_{c3}$  = Bag sample voc concentration, as propane, mg  $C_3$ /std. liter.

$R_{c3}$  = FIA reading for bag gas sample, ppm propane.

$$K = \text{Conversion factor, } 0.00183 \frac{\text{mg propane / std. liter}}{\text{ppm propane}}$$

6.4 Response factor, RF.

$$RF = C_{voc}/C_{c3}$$

Where:

RF = Response factor, weight voc/weight propane.

6.5 Total voc content of the input voc containing liquid, as propane, L.

$$L = \sum_{J=1}^n \frac{V_{IJ} W_{IJ}}{RF_J} - \sum_{J=1}^n \frac{V_{FJ} W_{FJ}}{RF_J} + \sum_{J=1}^n \frac{V_{AJ} W_{AJ}}{RF_J}$$

Where:

L = Total voc content of liquid input, calculate as propane, kg.

$V_{IJ}$  = Initial voc weight fraction of voc liquid J.

$V_{FJ}$  = Final voc weight fraction of voc liquid J.



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$V_{AJ}$  = Voc weight fraction of voc liquid J added during the test.

$W_{IJ}$  = Weight of voc containing liquid J at beginning of test, kg.

$W_{FG}$  = Weight of voc containing liquid J at end of test, kg.

$W_{AJ}$  = Weight of voc containing liquid J added during the test, kg.

$RF_J$  = Response factor for voc in liquid J, weight voc/weight propane.

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FIGURE 1. VOC Distillation Apparatus  
Paint Solvent Distillation Schematic

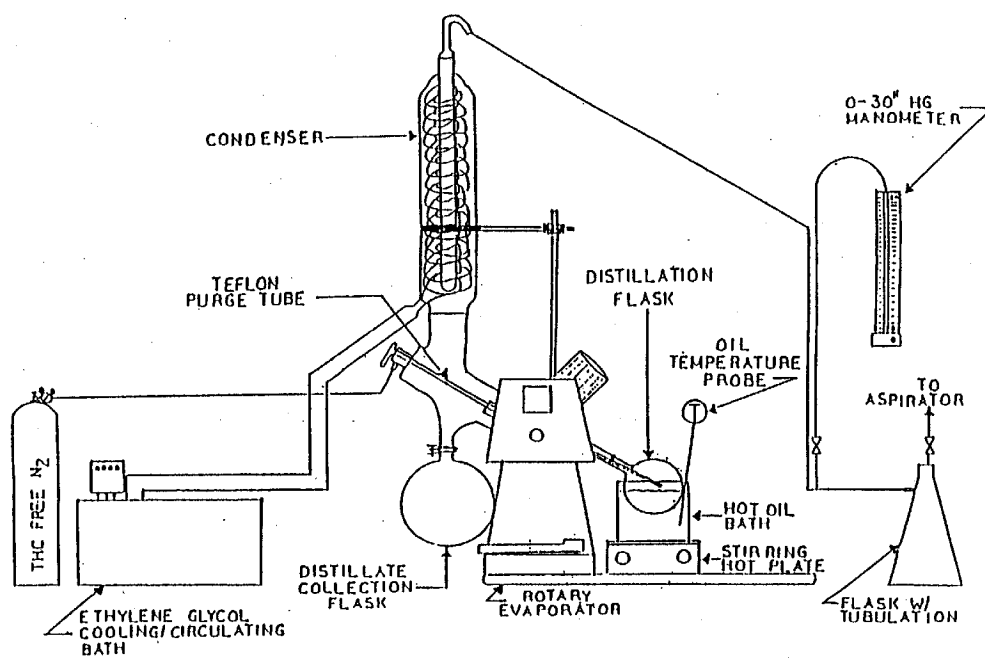
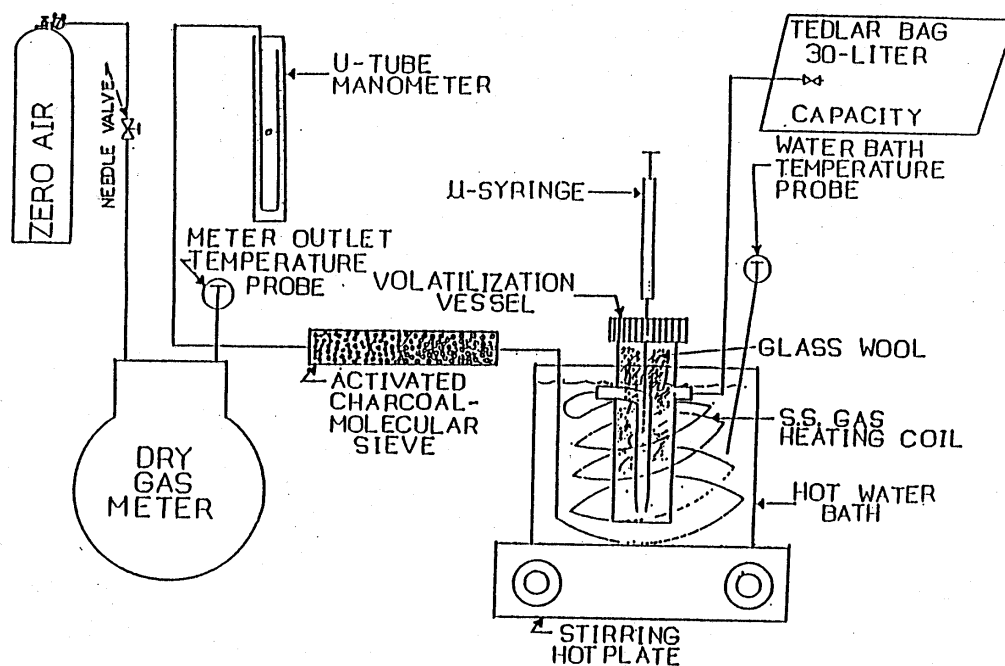


FIGURE 2. Bag Sample Generation System



Sample Preparation Equipment Schematic  
Response Factor Determination Procedure

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History: 1993 MR 4, Eff. Apr. 28, 1993; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2010**

**Source:** 1997 AACS.

**R 336.2011 Reference test method 5B.**

Rule 1011. Reference test method 5B, in-stack filtration method, reads as follows:

(a) The principle, applicability, and performance test criteria are as follows:

(i) Principle. Particulate matter is withdrawn isokinetically from the source and collected on solid filtering media maintained at stack temperature. The particulate matter mass is determined gravimetrically after removal of uncombined water.

(ii) Applicability. This method is applicable for the determination of particulate emissions from stationary sources as identified in table 31 of R 336.1331. The method is also applicable when specifically provided for in the department's rules, orders, a permit to install, or a permit to operate.

(iii) Performance test criteria:

(A) A performance test shall consist of a minimum of 3 separate samples of a specific air contaminant conducted within a 36-hour period, unless otherwise authorized by the department. Each of the 3 separate samples shall be obtained while the source is operating at a similar production level. For the purpose of determining compliance with an applicable emission limit, rule, or permit condition, the arithmetic mean of results of the 3 samples shall apply. If a sample is accidentally lost or conditions occur in which 1 of the 3 samples must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sampling train, extreme meteorological conditions, or other circumstances beyond the owner's or operator's control, compliance may, upon the approval of the department, be determined using the arithmetic mean of the results of 2 samples.

(B) For any source that is subject to an emission limitation calculated to 50% excess air, the multipoint, integrated sampling procedure of R 336.2004(1)(c) shall be used for gas analysis. For All other sources that require a determination of the molecular weight of the exhaust, any optional sampling procedure of R 336.2004(1)(c) may be used. Alternatives or modifications to procedures are subject to the approval of the department.

(C) The minimum volume per sample shall be 30 cubic feet of dry gas corrected to standard conditions (70 degrees Fahrenheit, 29.92 inches mercury). Minimum sample time shall be 60 minutes, which may be continuous or a combination of shorter sampling periods for sources that operate in a cyclic manner. Smaller sampling times or sample volumes, when necessitated by process variables or other factors, may be approved by the department.

(D) For any source whose emission control device alters the moisture content of the exhaust gas, a moisture determination shall be performed in a location upstream from the emission control device and in accordance with R 336.2004(1)(d) or an alternative method approved by the department.

(b) The following provisions apply to apparatus:

(i) Sampling train. A schematic of the sampling train used in this method is shown in figure 102. Construction details for many, but not all, of the train components are given in APTD-0581. (See subdivision (g)(ii) of this rule.) For changes from the APTD-0581 document and for allowable modifications to figure 102, consult with the department.

The operating and maintenance procedures for many, but not all, of the sampling train are described in APTD-0576. (See subdivision (g)(iii) of this rule.) Since correct usage is important in obtaining valid results, all users shall read APTD-0576 and adopt the applicable operating and maintenance procedures outlined in it, unless otherwise specified herein. The sampling train consists of the following components:

(A) Probe nozzle. Stainless steel (316) or glass with sharp, tapered leading edge. The angle of taper shall be less than 30 degrees and the taper shall be on the outside to preserve a constant internal diameter. The probe nozzle shall be of the button-hook design, unless otherwise specified by the department. If made of stainless steel, the nozzle shall be constructed from seamless tubing. Other materials of construction may be used, subject to the approval of the department.

A range of nozzle sizes suitable for isokinetic sampling shall be available, for example, 0.32 to 1.27 cm (1/8 to 1/2 in. - or larger if higher volume sampling trains are used - inside diameter (ID) nozzles in increments of 0.16 cm (1/16 in.). Each nozzle shall be calibrated according to the procedures outlined in subdivision (e) of this rule.

(B) Probe liner. Interior surface may be constructed of stainless steel (no specific grade), glass, teflon, or such other material that maintains proper flow at the stack conditions experienced.

(C) Pitot tube. Type S, as described in section 2.1 of method 2, or other device approved by the department. The pitot tube shall be attached to the probe, as shown in figure 102, to allow constant monitoring of the stack gas velocity. The impact (high pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (see method 2, figure 2-6b) during sampling. The type S pitot tube assembly shall have a known coefficient, determined as outlined in section 4 of method 2.

(D) Differential pressure gauge. Incline manometer or equivalent devices (2) as described in section 2.2 of method 2. One manometer shall be used for velocity head ( p ) readings and the other shall be used for orifice differential pressure readings.

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(E) Filter holders. Two separate filter holders in series or 1 filter holder with separate filter supports and seals for 2 filters. One filter holder with 2 filters held in contact with each other is not acceptable. Materials of construction may be stainless steel (316), glass, teflon, or such other material approved by the department.

(F) Filter heating system. Auxiliary heating of the filter media is not acceptable. For saturated stack gases, the operator may opt to use filters that do not blind when wet and that do not require heating (see subdivision (c)(i)(A) of this rule).

(G) Condenser. The following system shall be used to determine the stack gas moisture content: Three impingers connected in series with leak-free ground glass fittings or any similar leak-free noncontaminating fittings. All impingers shall be of the Greenburg-Smith design and shall be modified by replacing the tip with a 1.3 cm (1/2 in.) ID glass tube extending to about 1.3 cm (1/2 in.) from the bottom of the flask. Modifications, such as using flexible connections between the impingers or using materials other than glass, are permitted, subject to the approval of the department. The first impinger shall contain a known quantity of water (subdivision (d)(i)(C) of this rule); the second shall be empty; and the third shall contain a known weight of silica gel or equivalent desiccant.

Alternatively, any system that cools the sample gas stream and allows measurement of the water condensed and moisture leaving the condenser, each to within 1 ml or 1 g, may be used, subject to the approval of the department. In any case, the means for measuring the moisture leaving the condenser shall be by passing the sample gas stream through a tared silica gel, or equivalent desiccant, trap with exit gases kept below 20 degrees Centigrade (68 degrees Fahrenheit) and determining the weight gain.

If a determination of the particulate matter collected in the impingers is required by the department's rules, a permit to install, or a permit to operate, the impinger system described above shall be used without modification. Contact the department as to the sample recovery and analysis of the impinger contents.

(H) Metering system. Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 3 degrees Centigrade (5.4 degrees Fahrenheit), dry-gas meter capable of measuring volume to within 2%, and related equipment as shown in figure 102. Other metering systems capable of maintaining sampling rates within 10% of isokinetic and capable of determining sample volumes to within 2% may be used, subject to the approval of the department. When the metering system is used in conjunction with a pitot tube, the system shall enable checks of isokinetic rates.

Sampling trains utilizing metering systems designed for higher flow rates than those described in APTD-0581 or APTD-0576 may be used if the specifications of this method are met.

(I) Barometer. Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in. Hg). In many cases, the barometric reading may be obtained from a nearby national weather service station. In this case, the station value, which is the absolute barometric pressure, shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 30 M (100 ft.) elevation increase or vice versa for elevation decrease.

(J) Gas density determination equipment. Temperature sensor and pressure gauge, as described in sections 2.3 and 2.4 of method 2, and gas analyzer, if necessary, as described in method 3. The temperature sensor shall, preferably, be permanently attached to the pitot tube or sampling probe in a fixed configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor may be attached just prior to use in the field. Note, however, that if the temperature sensor is attached in the field, the sensor shall be placed in an interference-free arrangement with respect to the type S pitot tube openings (see method 2, figure 2-7). As a second alternative, if a difference of not more than 1% in the average velocity measurement is to be introduced, the temperature gauge need not be attached to the probe or pitot tube. This alternative is subject to the approval of the department.

"Construction Details of Isokinetic Source Sampling Equipment," APTD-0581, April 1971 (PB203-060-LL), and "Maintenance, Calibration, and Operation of Isokinetic Source Sampling Equipment," APTD-0576, March 1972 (PB209-022-LL), are adopted by reference in this rule. Copies of these documents may be inspected at the Lansing office of the air quality division of the department of environmental quality. Copies of APTD-0581 and APTD-0576 may be obtained from the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, or from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161, at a cost at the time of adoption of these rules of \$28.50 each.

(ii) Sample recovery. The following items are needed:

(A) Probe-liner and probe-nozzle brushes. Nylon bristle brushes with stainless steel wire handles. The probe brush shall have extensions, at least as long as the probe, made of stainless steel, nylon, teflon, or similarly inert material. The brushes shall be properly sized and shaped to brush out the probe liner and nozzle.

(B) Wash bottles -- 2. Glass wash bottles are recommended; polyethylene wash bottles may be used at the option of the tester. It is recommended that acetone not be stored in polyethylene bottles for longer than a month.

(C) Glass sample storage containers. Chemically resistant, borosilicate glass bottles for acetone washes, 500 ml or 1000 ml. Screw cap liners shall either be rubber-backed teflon or shall be constructed so as to be leak-free and resistant to chemical attack by acetone. Narrow-mouth glass bottles have been found to be less prone to leakage. Alternatively, polyethylene

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bottles may be used.

(D) Filter containers. Glass, polyethylene, or aluminum tube containers, unless otherwise specified by the department.

(E) Graduated cylinder or balance. To measure condensed water to within 1 ml or 1 g. Graduated cylinders shall have subdivisions of not more than 2 ml. Most laboratory balances are capable of weighing to the nearest 0.5 g or less. Any of these balances are suitable for use here and in paragraph (iii)(D) of this subdivision.

(F) Plastic storage containers. Airtight containers to store silica gel.

(G) Funnel and rubber policeman. To aid in the transfer of silica gel to container; not necessary if silica gel is weighed in the field.

(H) Funnel. Glass or polyethylene, to aid in sample recovery.

(iii) Analysis. The following equipment is needed for analysis:

(A) Glass weighing dishes.

(B) Desiccator.

(C) Analytical balance. To measure to within 0.1 mg.

(D) Balance. To measure to within 0.5 mg.

(E) Beakers. 250 ml.

(F) Hygrometer. To measure the relative humidity of the laboratory environment.

(G) Temperature gauge. To measure the temperature of the laboratory environment.

(c) The following provisions apply to reagents:

(i) Sampling. The reagents used in sampling are as follows:

(A) Filters. Two in-stack filters may be any combination of alundum ceramic thimble filters, type RA-98, or glass fiber filters, type A without organic binder. The size of such filters shall allow proper sampling rates to maintain isokinetics using the nozzle sizes specified in subdivision (b)(i)(A) of this rule.

Alternatively, other types of filters may be used, subject to the approval of the department.

(B) Silica gel. Indicating type, 6 to 16 mesh. If previously used, dry at 175 degrees Centigrade (350 degrees Fahrenheit) for 2 hours. New silica gel may be used as received. Alternatively, other types of desiccants that are equivalent or better may be used, subject to the approval of the department.

(C) Water. When analysis of the material caught in the impingers is required, distilled water shall be used. Run blanks prior to field use to eliminate a high blank of test samples.

(D) Crushed ice.

(E) Stopcock grease. Acetone-insoluble, heat-stable silicone grease. This is not necessary if screw-on connectors with teflon sleeves, or equivalent, are used. Alternatively, other types of stopcock grease may be used, subject to the approval of the department.

(ii) Sample recovery. Washing solvent. Either acetone or distilled water may be used for sample recovery. If acetone is used for washing solvent, then reagent grade, less than 0.001% residue, in glass bottles is required. Acetone from metal containers generally has a high residue blank and shall not be used.

Suppliers sometime transfer acetone to glass bottles from metal containers; thus, acetone blanks shall be run prior to field use and only acetone with low blank values (less than 0.001%) shall be used. In no case shall a blank value of more than 0.001% of the weight of acetone used be subtracted from the sample weight.

If distilled water is used for washing solvent, use distilled water with less than 0.001% residue. Run blanks prior to field use to eliminate a high blank on test samples.

(iii) Analysis. Two reagents are required for the analysis:

(A) Solvent. Same as paragraph (ii) of this subdivision for quantitative transfer.

(B) Desiccant. Anhydrous calcium sulfate, indicating type. Alternatively, other types of desiccants may be used, subject to the approval of the department.

(d) The following provisions apply to procedure:

(i) Sampling. The complexity of this method is such that, in order to obtain reliable results, testers shall be trained and experienced with the test procedures. Sampling shall comply with the following provisions:

(A) Pretest preparation. All the components shall be maintained and calibrated according to the applicable procedures described in APTD-0576, unless otherwise specified in this rule.

Weigh several 200 to 300 g portions of silica gel in airtight containers to the nearest 0.5 g. Record the total weight of the silica gel plus container on each container. As an alternative, the silica gel need not be preweighed, but may be weighed directly in its impinger or sampling holder just prior to train assembly.

Check filters visually against light for irregularities, flaws, pinhole leaks, or cracks. Label filters of the proper size on the back side using numbering machine ink. As an alternative, label the shipping containers (subdivision (b)(ii)(D) of this rule) and keep the filters in these containers at all times, except during sampling and weighing.

Dry the filters in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1

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hour in a desiccator containing anhydrous calcium sulfate, and individually weigh and record their weights to the nearest 0.1 mg. During the weighing, the filter shall not be exposed to the laboratory atmosphere for a period of more than 2 minutes and a relative humidity above 50%. Procedures, other than those specified, that account for relative humidity effects may be used, subject to the approval of the department.

(B) Preliminary determinations. Select the sampling site and the minimum number of sampling points according to method 1 or as specified by the department. Determine the stack pressure, temperature, and the range of velocity heads using method 2; it is recommended that a leak check of the pitot lines (see method 2, section 3.1) be performed. Determine the moisture content using approximation method 4, or its alternatives, for the purpose of making isokinetic sampling rate settings. Determine the stack gas dry molecular weight, as described in method 2, section 3.6; if integrated method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the particulate sample run.

Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates. During the run, do not change the nozzle size. Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see section 2.2 of method 2).

Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, consider sampling from opposite sides of the stack to reduce the length of probes.

Select a total sampling time greater than or equal to the minimum total sampling time specified in the department's rules so that the sampling time per point is not less than 5 minutes, unless approved by the department, or some greater time interval as specified by the department, and so that the sample volume taken, corrected to standard conditions, exceeds the required minimum total gas sample volume. The latter is based on an approximate average sampling rate.

It is recommended that the number of minutes sampled at each point be an integer or an integer plus 1/2 minute to avoid timekeeping errors.

In some circumstances, such as in batch cycles, it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas sample volumes. In these cases, the department's approval shall first be obtained.

(C) Preparation of collection train. During preparation and assembly of the sampling train, keep all openings where contamination can occur covered until just prior to assembly or until sampling is about to begin.

Place 100 ml of water in the first impinger, leave the second impinger empty, and transfer approximately 200 to 300 g of preweighed silica gel from its container to the third impinger. More silica gel may be used, but care should be taken to ensure that it is not entrained and carried out from the impinger during sampling. Place the container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

Using tweezers or clean disposable surgical gloves, place a labeled (identified) and weighed filter in each filter holder. Be sure that the filter is properly centered and the gasket properly placed so as to prevent the sample gas stream from circumventing the filter.

Install the selected nozzle using a Viton A O-ring when stack temperatures are less than 260 degrees Centigrade (500 degrees Fahrenheit) and an asbestos string gasket when temperatures are higher. See APTD-0576 for details. Other connecting systems using either 310 stainless steel or teflon ferrules may be used to form a leak-free direct mechanical connection. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

Set up the train as in figure 102. If necessary, use a very light coat of silicone grease on all ground glass joints. Grease only the outer portion (see APTD-0576) to avoid the possibility of contamination by the silicone grease.

Place crushed ice around the impingers.

(D) Leak check procedures:

(1) Pretest leak check. A pretest leak check is strongly recommended, but not required, to prevent invalid sampling and wasted time. If the tester opts to conduct the pretest leak check, the following procedure shall be used:

Perform the leak check on the entire system, including filter housings and nozzle, by plugging the nozzle and pulling a 380 mm Hg (15 in. Hg) vacuum. Alternatively, a lower vacuum may be used if it is not exceeded during the test. Leakage rates in excess of 4% of the average sampling rate or 0.00057 m<sup>3</sup>/min (0.02 cfm), whichever is less, are unacceptable.

The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with the bypass valve fully open and the coarse adjust valve completely closed. Partially open the coarse adjust valve and slowly close the bypass valve until the desired vacuum is reached. Do not reverse the direction of the bypass valve; this will cause water to back up into the flexible sample tube and the probe. If the desired vacuum is exceeded, either leak-check at this higher vacuum or end the leak check and start over.

When the leak check is completed, first slowly remove the plug from the inlet to the nozzle and immediately turn off the vacuum pump. This prevents the water in the first impinger from being forced backward into the sample tube and prevents silica gel from being entrained backward into the second impinger.

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(2) Leak checks during sample run. If, during the sampling run, a component (such as a filter assembly or impinger) change becomes necessary, a leak check shall be conducted immediately before the change is made. The leak check shall be done according to the procedure outlined in paragraph (i)(D)(1) of this subdivision, except that it shall be done at a vacuum equal to or greater than the maximum value recorded up to that point in the test. If the leakage rate is found to be not more than 0.00057 m<sup>3</sup>/min (0.02 cfm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered; if, however, a higher leakage rate is obtained, the tester shall either record the leakage rate and plan to correct the sample volume, as shown in subdivision (f)(iii) of this rule, or shall void the sampling run.

Immediately after component changes, leak checks are optional; if such leak checks are done, the procedure outlined in paragraph (i)(D)(1) of this subdivision shall be used.

(3) Post-test leak check. A leak check is mandatory at the conclusion of each sampling run. The leak check shall be done in accordance with the procedures outlined in paragraph (i)(D)(1) of this subdivision, except that it shall be conducted at a vacuum equal to or greater than the maximum value reached during the sampling run. If the leakage rate is found to be not more than 0.00057 m<sup>3</sup>/min (0.02 cfm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered. If, however, a higher leakage rate is obtained, the tester shall either record the leakage rate and correct the sample volume, as shown in subdivision (f)(iii) of this rule, or shall void the sampling run.

(E) Particulate train operation. During the sampling run, maintain an isokinetic sampling rate that is within 10% of true isokinetic, unless otherwise specified by the department.

For each run, record the data required on a data sheet such as the one shown in figure 104. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak check, and when sampling is halted. Take other readings required by figure 104 at least once at each sample point during each time increment, and take additional readings when significant changes (20% variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

Clean the portholes prior to the test run to minimize the chance of sampling deposited material. To begin sampling, remove the nozzle cap and verify that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs that aid in the rapid adjustment of the isokinetic sampling rate without excessive computations are available. These nomographs are designed for use when the type S pitot tube coefficient is  $0.85 \pm 0.02$  and the stack gas equivalent density (dry molecular weight) is equal to  $29 \pm 4$ . APTD-0576 details the procedure for using the nomographs. If  $C_p$  and  $M_d$  are outside the above stated ranges, do not use the nomographs unless appropriate steps (subdivision (g)(iv) of this rule) are taken to compensate for the deviations.

When the stack is under significant negative pressure (height of impinger stem), take care to pull low flow when inserting the probe into the stack to prevent water from backing into the sample tubing and to avoid pulsation through the filter and possible loss of materials.

When the probe is in position, block off the openings around the probe and porthole to prevent unrepresentative dilution of the gas stream.

Traverse the stack cross section, as required by method 1 or as specified by the department, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the portholes; this minimizes the chance of extracting deposited material.

During the test run, add more ice and, if necessary, salt to maintain a temperature of less than 20 degrees Centigrade (68 degrees Fahrenheit) at the condenser/silica gel outlet. Also, periodically check the level and zero of the manometer.

If the pressure drop across the filter becomes too high and makes isokinetic sampling difficult to maintain, the filter may be replaced in the midst of a sample run. It is recommended that another complete filter assembly be used rather than attempting to change the filter itself. Before a new filter assembly is installed, conduct a leak check (paragraph (i)(D)(2) of this subdivision). The total particulate weight shall include the summation of all filter assembly catches.

A single train shall be used for the entire sample run, except in cases where simultaneous sampling is required in 2 or more separate ducts, at 2 or more different locations within the same duct, or where equipment failure necessitates a change of trains. In all other situations, the use of 2 or more trains shall be subject to the approval of the department.

Note that when 2 or more trains are used, separate analyses of the front-half and, if applicable, impinger catches from each train shall be performed, unless identical nozzle sizes were used on all trains. If identical nozzle sizes were used, the front-half catches from the individual trains may be combined, as may the impinger catches, and 1 analysis of front-half catch and 1 analysis of impinger catch may be performed. Consult with the department for details concerning the calculation of results when 2 or more trains are used.



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At the end of the sample run, turn off the coarse adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry-gas meter reading, and conduct a post-test leak check, as outlined in paragraph (i)(D)(3) of this subdivision. Also, leak-check the pitot lines as described in method 2, section 3.1; the lines shall pass this leak check to validate the velocity head data.

(F) Calculation of percent isokinetic. Calculate percent isokinetic (see subdivision (f) of this rule) to determine whether the run was valid or whether another test run should be made. If there was difficulty in maintaining isokinetic rates due to source conditions, consult with the department for possible variance on the isokinetic rates.

(ii) Sample recovery. Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool.

When the probe can be safely handled, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over it to prevent losing or gaining particulate matter. Do not cap off the probe tip tightly while the sampling train is cooling down as this creates a vacuum in the filter holder and draws water from the impingers into the sample tube.

Before moving the sampling train to the cleanup site, make sure all condensed water in the probe and flexible sample lines drains into the first impinger. Disconnect all sample lines and remove the nozzle-filter set assembly from the probe. Cap all openings to prevent contamination or accidental loss of sample. Remove all excess particulate from the exterior of the nozzle-filter assembly to prevent contamination during disassembly.

Transfer the nozzle-filter set assembly and impinger set to the cleanup area. This area shall be clean and protected from the wind so that the chances of contaminating or losing the sample are minimized.

Save a portion of the solvent used for cleanup as a blank. Take 200 ml of this solvent directly from the wash bottle being used and place it in a glass sample container labeled "solvent blank".

Inspect the train prior to and during disassembly and note any abnormal conditions. Treat the samples as follows:

Container Nos. 1, 1A. Carefully remove the filters from the filter holders and place in their identified containers. Use a pair of tweezers or clean disposable surgical gloves, or both, to handle the filters. Carefully transfer to the container any particulate matter or filter fibers, or both, that adhere to the filter holder gasket by using a dry nylon bristle brush or sharp-edged blade, or both. Seal the containers.

Container No. 2. Taking care to see that particulate on the outside of the nozzle and filter holders does not get into the sample, the testor shall carefully remove the nozzle and clean the inside surface by rinsing with solvent from a wash bottle and brushing with a nylon bristle brush. Brush until the solvent rinse shows no visible particles and then make a final rinse of the inside surface with solvent.

After ensuring that all joints have been cleaned of all extraneous material, the testor shall quantitatively remove particulate from the filter holders by rubbing the surfaces with a nylon bristle brush and rinsing with solvent. Rinse each surface 3 times, or more if needed, to remove visible particulate. Make a final rinse of the brush and filter holder set. After all solvent washings and particulate matter have been collected in the sample container, tighten the lid on the sample container so that solvent will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether or not leakage occurred during transport. Label the container to clearly identify its contents.

Container No. 3. Note the color of the indicating silica gel to determine if it has been completely spent and make a notation of its condition. Transfer the silica gel from the third impinger to its original container and seal. A funnel may make it easier to pour the silica gel without spilling it. A rubber policeman may be used as an aid in removing the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, follow the procedure for container No. 3 in paragraph (iii) of this subdivision.

Impinger water. Treat the impingers as follows: Make a notation of any color or film in the liquid catch. Measure the liquid that is in the first 2 impingers to within  $\pm 1$  ml by using a graduated cylinder or by weighing it to within  $\pm 1.0$  g by using a balance if one is available. Record the volume or weight of liquid present. This information is required to calculate the moisture content of the effluent gas.

Discard the liquid after measuring and recording the volume or weight, unless analysis of the impinger catch is required (subdivision (b)(i)(G) of this rule).

If a different type of condenser is used, measure the amount of moisture condensed either volumetrically or gravimetrically. Whenever possible, containers shall be shipped in a manner that keeps them upright at all times.

(iii) Analysis. Record the data required on a sheet such as the one shown in figure 106. Handle each sample container as follows:

Container Nos. 1, 1A. Analyze and report each filter separately. Transfer the filter and any loose particulate from the sample container to a tared-glass weighing dish. Dry the filter in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1 hour in a desiccator containing anhydrous calcium sulfate and weigh and record its weight to the nearest 0.1 mg. During the weighing the filter shall not be exposed to the laboratory atmosphere for a period greater than 2 minutes or a relative humidity above 50%. Procedures, other than those specified, that account for relative

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humidity effects may be used, subject to the approval of the department. The method used for drying and weighing of filters shall be consistent before and after the test.

Container No. 2. Note the level of liquid in the container and confirm on the analysis sheet whether or not leakage occurred during transport. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the department, to correct the final results. Measure the liquid in this container either volumetrically to  $\pm 1$  ml or gravimetrically to  $\pm 1.0$  g. Transfer the contents to a tared 250 ml beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

Container No. 3. Weigh the spent silica gel, or silica gel plus impinger, to the nearest 0.5 g using a balance. This step may be conducted in the field.

"Solvent blank" container. Measure solvent in this container either volumetrically or gravimetrically. Transfer the contents to a tared 250 ml beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

If acetone is used, the contents of Container No. 2, as well as the acetone blank container, may be evaporated at temperatures higher than ambient. If evaporation is done at an elevated temperature, the temperature shall be closely supervised, and the contents of the beaker shall be swirled occasionally to maintain an even temperature. Use extreme care, as acetone is highly flammable and has a low flash point.

(e) Calibration. Maintain a laboratory log of all calibrations. Calibrations shall comply with the following provisions:

(i) Probe nozzle. Probe nozzles shall be calibrated before their initial use in the field. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in.). Make 3 separate measurements using different diameters each time and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in.). When nozzles become nicked, dented, or corroded, they shall be reshaped, sharpened, and recalibrated before use. Each nozzle shall be permanently and uniquely identified.

(ii) Pitot tube. The type S pitot tube assembly shall be calibrated according to the procedures outlined in section 4 of method 2.

(iii) Metering system. Before its initial use in the field, the metering system shall be calibrated according to the procedure outlined in APTD-0576. Instead of physically adjusting the dry-gas meter dial readings to correspond to the wet-test meter readings, calibration factors may be used to mathematically correct the gas meter dial readings to the proper values. Before calibrating the metering system, it is suggested that a leak check be conducted. For metering systems having diaphragm or rotary pumps, the normal leak check procedure will not detect leakages within the pump. For these cases, the following leak check procedure is suggested: Make a 10-minute calibration run at  $0.00057 \text{ m}^3/\text{min}$  (0.02 cfm); at the end of the run, take the difference of the measured wet-test meter and dry-gas meter volumes; divide the difference by 10 to get the leak rate. The leak rate shall not exceed  $0.00057 \text{ m}^3/\text{min}$  (0.02 cfm).

After each field use, the calibration of the metering system shall be checked by performing 3 calibration runs at a single, intermediate orifice setting, based on the previous field test, with the vacuum set at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet-test meter and the inlet of the metering system. Calculate the average value of the calibration factor. If the calibration has changed by more than 5%, recalibrate the meter over the full range of orifice settings, as outlined in APTD-0576.

Alternatively, a spirometer may be substituted for a wet-test meter in the above mentioned calibration procedures.

Alternative procedures, such as using the orifice meter coefficients, may be used, subject to the approval of the department. If the dry-gas meter coefficient values obtained before and after a test series differ by more than 5%, the test series shall be performed using whichever meter coefficient value (before or after) gives the lower value of total sample volume.

(iv) Temperature gauges. Use the procedure in section 4.3 of method 2 to calibrate in-stack temperature gauges. Dial thermometers, such as those used for the dry-gas meter and condenser outlet, shall be calibrated against mercury-in-glass thermometers.

(v) Leak check of metering system shown in figure 102. That portion of the sampling train from the pump to the orifice meter shall be leak-checked prior to initial use and after each shipment. Leakage after the pump will result in less volume being recorded than is actually sampled. The following procedure is suggested (see figure 107): Close the main valve on the meter box. Insert a 1-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13 to 18 cm (5 to 7 in.) water column by blowing into the rubber tubing. Pinch off the tubing and observe the manometer for 1 minute. A loss of pressure on the manometer indicates a leak in the meter box; leaks, if present, shall be corrected.

(vi) Barometer. Calibrate against a mercury barometer.

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(f) Calculations. When carrying out calculations, retain at least 1 extra decimal figure beyond that of the acquired data. Round off figures after the final calculation. Other forms of the equations may be used if they give equivalent results. The following provisions apply to calculations:

(i) Nomenclature:

$A_n$  = Cross-sectional area of nozzle,  $m^2(ft.^2)$ .

$A$  = Cross-sectional area of stack or flue at the point of sampling,  $ft^2$ .

$B_{ws}$  = Water vapor in the gas stream, proportion by volume, expressed as a fraction.

$B_{wi}$  = Percent water vapor in gas entering source particulate control device determined by method 4.

$B_{wo}$  = Percent water vapor in gas exiting source particulate control device.

$C_a$  = Wash blank residue concentration,  $mg/g$ .

$C_s$  = Concentration of particulate matter in stack gas, moisture excluded, pounds of actual stack gas.

$C_{sD}$  = Concentration of particulate matter in stack gas, moisture excluded, pounds per 1000 pounds of dry stack gas.

$C_{s50}$  = Concentration of particulate matter corrected to 50% excess air, pounds per 1000 pounds of stack gas.

$C_{s50D}$  = Concentration of particulate matter corrected to 50% excess air, excluding any water addition from a collector, pounds per 1000 pounds of stack gas.

$E$  = Mass emission rate of particulate,  $lb/hr$ .

$F_{50}$  = Concentration conversion factor to 50% excess air with no moisture alterations in exhaust.

$F_{50D}$  = Concentration conversion factor to 50% excess air, excluding any moisture added to exhaust gas by pollution collection system.

$F_D$  = Concentration conversion factor to dry basis, excluding any water in the stack gas.

$I$  = Percent of isokinetic sampling.

$L_a$  = Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to  $0.00057 m^3/min$  ( $0.02 cfm$ ) or 4% of the average sampling rate, whichever is less.

$L_i$  = Individual leakage rate observed during the leak check conducted BEFORE the "ith" component change ( $i = 1, 2, 3 \dots n$ ),  $m^3/min$  ( $cfm$ ).

$L_p$  = Leakage rate observed during the post-test leak check,  $m^3/min$  ( $cfm$ ).

$M_d$  = Molecular weight of dry stack gas,  $g/g$  mole ( $lb/lb$ -mole), calculated by method 3, equation 3-2, using data from integrated method 3.

$m_n$  = Total amount of particulate matter collected,  $mg$ .

$M_w$  = Molecular weight of water,  $18.0 g/g$ -mole ( $18.0 lb/lb$ -mole).

$m_a$  = Mass of residue of solvent after evaporation,  $mg$ .

$m_g$  = Total weight of gas samples through nozzle,  $lb$ .

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$P_{\text{bar}}$  = Barometric pressure at the sampling site, mm Hg (in. Hg).

$P_s$  = Absolute stack gas pressure.

$P_{\text{std}}$  = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

$R$  = Ideal gas constant, 0.06236 mm Hg-m<sup>3</sup>/°K-g-mole (21.85 in. Hg-ft.<sup>3</sup>/°R-lb-mole).

$T_m$  = Absolute average dry-gas meter temperature (see figure 104), °K (°R).

$T_s$  = Absolute average stack gas temperature (see figure 104), °K (°R).

$T_{\text{std}}$  = Standard absolute temperature, 294.1°K (530°R).

$V_a$  = Volume of solvent blank, ml.

$V_{\text{aw}}$  = Volume of solvent used in wash, ml.

$V_{\text{lc}}$  = Total volume of liquid collected in impingers and silica gel (see figure 106), ml.

$V_m$  = Volume of gas sample as measured by the dry-gas meter, dcm (dcf).

$V_{m(\text{std})}$  = Volume of gas sample measured by the dry-gas meter, corrected to standard conditions, dscm (dscf).

$V_{w(\text{std})}$  = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf).

$V_s$  = Stack gas velocity, calculated by method 2, equation 2-9, using data obtained from method 5, m/sec (ft./sec).

$W_a$  = Weight of residue in solvent wash, mg.

$Y$  = Dry-gas meter calibration factor.

$\Delta H$  = Average pressure differential across the orifice meter (see figure 104), mm H<sub>2</sub>O (in. H<sub>2</sub>O).

%O<sub>2</sub> = Percent oxygen in stack gas by volume (dry basis).

%N<sub>2</sub> = Percent nitrogen in stack gas by volume (dry basis).

$p_a$  = Density of solvent, mg/ml.

$p_{s(\text{std})}$  = Density of all sampled gas at standard conditions, lb/ft.<sup>3</sup>

$p_w$  = Density of water, 0.9982 g/ml (0.002201 lb/ml).

$\Theta$  = Total sample time, min.

$\Theta_1$  = Sample time, interval, from the beginning of a run until the first component change, min.

$\Theta_i$  = Sampling time interval, between 2 successive component changes, beginning with the interval between the first and second changes, min.

$\Theta_p$  = Sampling time interval, from the final (n<sup>th</sup>) component change until the end of the sampling run, min.

13.6 = Specific gravity of mercury.

60 = Sec/min.

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100 = Conversion to percent.

386.9 = Cubic feet per lb-mole of ideal gas at standard conditions.

453.6 = Conversion of pounds to grams.

3600 = Conversion of hours to sec.

1000 = Conversion of 1000 lb units to lb units.

(ii) Average the dry-gas meter temperature and average the orifice pressure drop. See data sheet (figure 5-2).

(iii) Dry gas volume. Correct the sample volume measured by the dry-gas meter to standard conditions (21.11 degrees Centigrade, 760 mm Hg or 70 degrees Fahrenheit, 29.92 in. Hg) by using equation 5-1.  
equation 5-1

$$V_{m(std)} = \frac{V_m Y T_{std} (P_{bar} + \Delta H / 13.6)}{T_m P_{std}} = K_1 V_m Y \frac{(P_{bar} + \Delta H / 13.6)}{T_m}$$

Where:

$K_1 = 0.3869$  °K/mm Hg for metric units.

$= 17.71$  °R/in. Hg for English units.

Equation 5-1 may be used as written. However, if the leakage rate observed during any of the mandatory leak checks (for example, the post-test leak check or leak checks conducted prior to component changes) exceeds  $L_a$ , equation 5-1 shall be modified as follows:

(A) Case I. No component changes made during sampling run. In this case, replace  $V_m$  in equation 5-1 with the expression:

$$V_m - (L_p - L_a) \theta$$

(B) Case II. One or more component changes made during the sampling run. In this case, replace  $V_m$  in equation 5-1 by the expression:

$$V_m - (L_i - L_a) \theta - \sum_{i=2}^n (L_i - L_a) \theta - (L_p - L_a) \theta_p$$

and substitute only for those leakage rates ( $L_i$  or  $L_p$ ) that exceed  $L_a$ .

(iv) Volume of water vapor.

equation 5-2

$$V_{w(std)} = V_{lc} (p_w / M_w) (R T_{std} / P_{std}) = K_2 V_{lc}$$

Where:

$K_2 = 0.001338$  m<sup>3</sup>/ml for metric units.

(v) Moisture content.

equation 5-3

$$B_{ws} = V_{w(std)} / (V_{m(std)} + V_{w(std)})$$

In saturated or water droplet--laden gas streams, 2 calculations of the moisture content of the stack gas shall be made: 1 from the impinger analysis (equation 5-3), and a second from the assumption of saturated conditions. The lower of the 2 values of  $B_{ws}$  shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the note of section 1.2 of method 4. For the purpose of this method, the average stack gas temperature from figure 104 may be used to make the determination, if the accuracy of the instack temperature sensor is  $\pm 1$  degree Centigrade (2 degrees Fahrenheit).

(vi) Solvent blank concentration.

equation 5-4

$$C_a = m_a / (V_a P_a)$$

(vii) Solvent wash blank.

equation 5-5

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$$W_a = C_a V_{aw} P_a$$

(viii) Total particulate weight. Determine the total particulate catch from the sum of the weights obtained from containers 1, 1A, and 2 less the wash solvent blank (see figure 106).

Refer to subdivision (d)(i)(E) of this rule to assist in the calculation of results involving 2 or more pairs of filters or 2 or more sampling trains.

(ix) Sampled gas density. Determine the density of the gas sampled from the stack, at standard conditions (lb/ft.<sup>3</sup>).  
equation 5-6

$$P_{s(std)} = (M_d (1 - B_{ws}) + M_w B_{ws}) / 386.9$$

(x) Total weight of gas sampled (lbs).  
equation 5-7

$$m_g = (V_{m(std)} + V_{w(std)}) P_{s(std)}$$

(xi) Particulate concentration (lbs/1000 lbs).  
equation 5-8

$$C_s = m_n / (453.6 m_g)$$

(xii) Excess air and moisture correction factors:

(A) Correction factor to 50% excess air for those sources with or without any particulate collector where no increase in moisture content of the exhaust gas occurs after the process and before the point of sampling.  
equation 5-9

$$F_{50} = \frac{M_d + 18 B_{wo} / (100 - B_{wo})}{0.1826 \% N_2 - 2.0592 \% O_2 + M_d + 18 B_{wo} / (100 - B_{wo})}$$

(B) Correction factor to 50% excess air for those sources with a wet collection device (scrubber) that increases the moisture content of the exhaust gas after the process and before the point of sampling.  
equation 5-10

$$F_{50D} = \frac{M_d + 18 B_{wo} / (100 - B_{wo})}{0.1826 \% N_2 - 2.0592 \% O_2 + M_d + 18 B_{wi} / (100 - B_{wi})}$$

(C) Correction factor to convert the actual concentration,  $C_s$ , to dry conditions.  
equation 5-11

$$F_D = \frac{M_d + 18 B_{wo} / (100 - B_{wo})}{M_d}$$

(xiii) Converted particulate concentrations, where applicable under the department's rules or permit.  
equation 5-12

$$C_{s50} = C_s F_{50}$$

equation 5-13

$$C_{s50D} = C_s F_{50D}$$

equation 5-14

$$C_{sD} = C_s F_D$$

(xiv) Mass emission rate (lb/hr).  
equation 5-15

$$E = \frac{3600 A V_s C_s P_s T_{std} P_{s(std)}}{1000 T_s P_{std}} = K_3 A V_s C_s P_s P_{s(std)} / T_s$$

Where:

$K_3 = 63.77$  for English units.

(xv) Isokinetic variation:

(A) Calculation from raw data.  
equation 5-16

$$I = \frac{100 T_s (K_4 V_{lc} + (V_m / T_m)(P_{bar} + \Delta H / 13.6))}{60 \theta V_s P_s A_n}$$

Where:

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$K_4 = 0.003458 \text{ mm Hg} \cdot \text{m}^3/\text{ml} \cdot ^\circ\text{K}$  for metric units.  
 $= 0.002672 \text{ in. Hg} \cdot \text{ft.}^3/\text{ml} \cdot ^\circ\text{R}$  for English units.

(B) Calculation from intermediate values.  
equation 5-17

$$I = \frac{T_s V_{m(std)} P_{std} 100}{T_{std} V_s \theta A_n P_s 60(1 - B_{ws})} = K_5 \frac{T_s V_{m(std)}}{P_s V_s A_n \theta (1 - B_{ws})}$$

Where:

$K_5 = 4.307$  for metric units.  
 $= 0.09409$  for English units.

(xvi) Acceptable results. If  $90\% \leq I \leq 110\%$ , the results are acceptable. If the results are low in comparison to the standard and I is beyond the acceptable range, or if I is less than 90%, the department may opt to accept the results. Otherwise, reject the results and repeat the test.

(g) Bibliography:

- (i) Federal Register, Volume 42, No. 160, Part 160, Chapter 1, Title 40, Appendix A, Method 5, August 18, 1977.
- (ii) Martin, Robert M. Construction Details of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0581. April, 1971.
- (iii) Rom, Jerome J. Maintenance, Calibration, and Operation of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0576. March, 1972.
- (iv) Shigehara, R. T. "Adjustments in the EPA Nomograph for Different Pitot Tube Coefficients and Dry Molecular Weights." Stack Sampling News, 2:4 - 11. October, 1974.
- (v) Guidelines for Source Testing of Particulate. Michigan Department of Natural Resources, Air Quality Division. June 1, 1977.

History: 1985 MR 2, Eff. Feb. 22, 1985; 1992 MR 9, Eff. Oct. 31, 1992; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2012 Reference test method 5C.**

Rule 1012. Reference test method 5C, outstack filtration method, reads as follows:

(a) The principle, applicability, and performance test criteria are as follows:

(i) Principle. Particulate matter is withdrawn isokinetically from the source and collected on solid filtering media maintained at a temperature in the range of  $120 \pm 14$  degrees Centigrade ( $248 \pm 25$  degrees Fahrenheit) or such other temperature as specified by the department's rules or a permit condition, or as approved by the department for a particular application. The particulate mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after removal of uncombined water.

(ii) Applicability. This method is applicable for the determination of particulate emissions from stationary sources as identified in table 31 of R 336.1331. The method is also applicable when specifically provided for in the department's rules, orders, a permit to install, or a permit to operate.

(iii) Performance test criteria:

(A) A performance test shall consist of a minimum of 3 separate samples of a specific air contaminant conducted within a 36-hour period, unless otherwise authorized by the department. Each of the 3 separate samples shall be obtained while the source is operating at a similar production level. For the purpose of determining compliance with an applicable emission limit, rule, or permit condition, the arithmetic mean of results of the 3 samples shall apply. If a sample is accidentally lost or conditions occur in which 1 of the 3 samples must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sampling train, extreme meteorological conditions, or other circumstances beyond the owner's or operator's control, compliance may, upon the approval of the department, be determined using the arithmetic mean of the results of 2 samples.

(B) For any source that is subject to an emission limitation calculated to 50% excess air, the multipoint, integrated sampling procedure of R 336.2004(1)(c) shall be used for gas analysis. For all other sources that require a determination of the molecular weight of the exhaust, any optional sampling procedure of R 336.2004(1)(c) may be used. Alternatives or modifications to procedures are subject to the approval of the department.

(C) The minimum volume per sample shall be 30 cubic feet of dry gas corrected to standard conditions (70 degrees Fahrenheit, 29.92 inches mercury). Minimum sample time shall be 60 minutes, which may be continuous or a combination of shorter sampling periods for sources that operate in a cyclic manner. Smaller sampling times or sample volumes, when necessitated by process variables or other factors, may be approved by the department.

(D) For any source whose emission control device alters the moisture content of the exhaust gas, a moisture determination shall be performed in a location upstream from the emission control device and in accordance with R 336.2004(1)(d) or an

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alternative method approved by the department.

(b) The following provisions apply to apparatus:

(i) Sampling train. A schematic of the sampling train used in this method is shown in figure 103. Construction details for many, but not all, of the train components are given in APTD-0581 (subdivision (g)(ii) of this rule). For changes from the APTD-0581 document and for allowable modifications to figure 103, consult with the department.

The operating and maintenance procedures for many, but not all, of the sampling train are described in APTD-0576 (subdivision (g)(iii) of this rule). Since correct usage is important in obtaining valid results, all users shall read APTD-0576 and adopt the applicable operating and maintenance procedures outlined in it, unless otherwise specified herein. The sampling train consists of the following components:

(A) Probe nozzle. Stainless steel (316) or glass with sharp, tapered leading edge. The angle of taper shall be less than 30 degrees and the taper shall be on the outside to preserve a constant internal diameter. The probe nozzle shall be of the button-hook design, unless otherwise specified by the department. If made of stainless steel, the nozzle shall be constructed from seamless tubing. Other materials of construction may be used, subject to the approval of the department.

A range of nozzle sizes suitable for isokinetic sampling shall be available, for example, 0.32 to 1.27 cm (1/8 to 1/2 in.) - or larger if higher volume sampling trains are used - inside diameter (ID) nozzles in increments of 0.16 cm (1/16 in.). Each nozzle shall be calibrated according to the procedures outlined in subdivision (e) of this rule.

(B) Probe liner. Borosilicate or quartz glass tubing with a heating system capable of maintaining a gas temperature at the exit end during sampling of  $120 \pm 14$  degrees Centigrade ( $248 \pm 25$  degrees Fahrenheit), another temperature as specified by the department's rules, or a temperature approved by the department for a particular application. The tester may opt to operate the equipment at a temperature lower than that specified. Since the actual temperature at the outlet of the probe is not usually monitored during sampling, probes constructed according to APTD-0581 which utilize the calibration curves of APTD-0576, or calibrated according to the procedure outlined in APTD-0576, are acceptable.

Either borosilicate or quartz glass probe liners may be used for stack temperatures up to about 480 degrees Centigrade (900 degrees Fahrenheit); quartz liners shall be used for temperatures between 480 and 900 degrees Centigrade (900 and 1,650 degrees Fahrenheit). Both types of liners may be used at higher temperatures than specified for short periods of time, subject to the approval of the department. The softening temperature for borosilicate is 820 degrees Centigrade (1,508 degrees Fahrenheit) and for quartz it is 1,500 degrees Centigrade (2,732 degrees Fahrenheit).

When practical, every effort shall be made to use borosilicate or quartz glass probe liners. Alternatively, metal liners, such as 316 stainless steel, Incoloy 825, or other corrosion-resistant materials made of seamless tubing, may be used, subject to the approval of the department.

(C) Pitot tube. Type S, as described in section 2.1 of method 2, or other device approved by the department. The pitot tube shall be attached to the probe, as shown in figure 103, to allow constant monitoring of the stack gas velocity. The impact (high pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (see method 2, figure 2-6b) during sampling. The type S pitot tube assembly shall have a known coefficient, determined as outlined in section 4 of method 2.

(D) Differential pressure gauge. Incline manometer or equivalent devices (2), as described in section 2.2 of method 2. One manometer shall be used for velocity head (p) readings, and the other shall be used for orifice differential pressure readings.

(E) Filter holders. Two separate filter holders in series or 1 filter holder with separate filter supports and seals for 2 filters. One filter holder with 2 filters held in contact with each other is not acceptable. Materials of construction may be stainless steel (316), glass, teflon, or such other material approved by the department.

(F) Filter heating system. Any heating system capable of maintaining a temperature around the filter holder during sampling of  $120 \pm 14$  degrees Centigrade ( $248 \pm 25$  degrees Fahrenheit), another temperature as specified by the department's rules or a permit condition, or a temperature approved by the department for a particular application. Alternatively, the tester may opt to operate the equipment at a temperature lower than that specified. A temperature gauge capable of measuring temperature to within 3 degrees Centigrade (5.4 degrees Fahrenheit) shall be installed so that the temperature around the filter holders can be regulated and monitored during sampling. Heating systems other than the one shown in APTD-0581 may be used.

(G) Condenser. The following system shall be used to determine the stack gas moisture content: Three impingers connected in series with leak-free ground glass fittings or any similar leak-free noncontaminating fittings. All impingers shall be of the Greenburg-Smith design and shall be modified by replacing the tip with a 1.3 cm (1/2 in.) ID glass tube extending to about 1.3 cm (1/2 in.) from the bottom of the flask. Modifications, such as using flexible connections between the impingers or using materials other than glass, are permitted subject to the approval of the department's staff. The first impinger shall contain a known quantity of water (subdivision (d)(i)(C) of this rule), the second shall be empty, and the third shall contain a known weight of silica gel or equivalent desiccant.

Alternatively, any system that cools the sample gas stream and allows measurement of the water condensed and moisture leaving the condenser, each to within 1 ml or 1 g, may be used subject to the approval of the department. In any case, the means for measuring the moisture leaving the condenser shall be by passing the sample gas stream through a tared silica gel,



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or equivalent desiccant, trap with exit gases kept below 20 degrees Centigrade (68 degrees Fahrenheit) and determining the weight gain.

If a determination of the particulate matter collected in the impingers is required by the department's rules, a permit to install, or a permit to operate, the impinger system described in this subparagraph shall be used, without modification. Contact the department as to the sample recovery and analysis of the impinger contents.

(H) Metering system. Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 3 degrees Centigrade (5.4 degrees Fahrenheit), dry-gas meter capable of measuring volume to within 2%, and related equipment as shown in figure 103. Other metering systems capable of maintaining sampling rates within 10% of isokinetic and capable of determining sample volumes to within 2% may be used, subject to the approval of the department. When the metering system is used in conjunction with a pitot tube, the system shall enable checks of isokinetic rates.

Sampling trains utilizing metering systems designed for higher flow rates than those described in APTD-0581 or APTD-0576 may be used if the specifications of this method are met.

(I) Barometer. Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in. Hg). In many cases, the barometric reading may be obtained from a nearby national weather service station. When obtained from this source, the station value, which is the absolute barometric pressure, shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 30 m (100 ft.) elevation increase or vice versa for elevation decrease.

(J) Gas density determination equipment. Temperature sensor and pressure gauge, as described in sections 2.3 and 2.4 of method 2, and gas analyzer, if necessary, as described in method 3. The temperature sensor shall, preferably, be permanently attached to the pitot tube or sampling probe in a fixed configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor may be attached just prior to use in the field. Note, however, that if the temperature sensor is attached in the field, the sensor shall be placed in an interference-free arrangement with respect to the type S pitot tube openings (see method 2, figure 2.7). As a second alternative, if a difference of not more than 1% in the average velocity measurement is to be introduced, the temperature gauge need not be attached to the probe or pitot tube. This alternative is subject to the approval of the department.

(ii) Sample recovery. The following items are needed:

(A) Probe-liner and probe-nozzle brushes. Nylon bristle brushes with stainless steel wire handles. The probe brush shall have extensions, at least as long as the probe, made of stainless steel, nylon, teflon, or similarly inert material. The brushes shall be properly sized and shaped to brush out the probe liner and nozzle.

(B) Wash bottles--2. Glass wash bottles are recommended; polyethylene wash bottles may be used at the option of the tester. It is recommended that acetone not be stored in polyethylene bottles for longer than a month.

(C) Glass sample storage containers. Chemically resistant, borosilicate glass bottles, for acetone washes, 500 ml or 1000 ml. Screw cap liners shall either be rubber-backed teflon or shall be constructed so as to be leak-free and resistant to chemical attack by acetone. Narrow-mouth glass bottles have been found to be less prone to leakage. Alternatively, polyethylene bottles may be used.

(D) Filter containers. Glass, polyethylene, or aluminum tube containers, unless otherwise specified by the department.

(E) Graduated cylinder or balance. To measure condensed water to within 1 ml or 1 g. Graduated cylinders shall have subdivisions of not more than 2 ml. Most laboratory balances are capable of weighing to the nearest 0.5 g or less. Any of these balances are suitable for use here and in paragraph (iii)(D) of this subdivision.

(F) Plastic storage containers. Airtight containers to store silica gel.

(G) Funnel and rubber policeman. To aid in the transfer of silica gel to container; not necessary if silica gel is weighed in the field.

(H) Funnel. Glass or polyethylene, to aid in sample recovery.

(iii) Analysis. The following equipment is needed for analysis:

(A) Glass weighing dishes.

(B) Desiccator.

(C) Analytical balance. To measure to within 0.1 mg.

(D) Balance. To measure to within 0.5 mg.

(E) Beakers. 250 ml.

(F) Hygrometer. To measure the relative humidity of the laboratory environment.

(G) Temperature gauge. To measure the temperature of the laboratory environment.

(c) The following provisions apply to reagents:

(i) Sampling. The reagents used in sampling are as follows:

(A) Filters. Two outstack filters may be any combination of alundum ceramic thimble filters, type RA-98 or glass fiber filters, type A without organic binder. The size of such filters shall allow proper sampling rates to maintain isokinetics using the nozzle sizes specified in subdivision (b)(i)(A) of this rule.

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Alternatively, other types of filters may be used, subject to the approval of the department.

(B) Silica gel. Indicating type, 6 to 16 mesh. If previously used, dry at 175 degrees Centigrade (350 degrees Fahrenheit) for 2 hours. New silica gel may be used as received. Alternatively, other types of desiccants (equivalent or better) may be used, subject to the approval of the department.

(C) Water. When analysis of the material caught in the impingers is required, distilled water shall be used. Run blanks prior to field use to eliminate a high blank on test samples.

(D) Crushed ice.

(E) Stopcock grease. Acetone-insoluble, heat-stable silicone grease. This is not necessary if screw-on connectors with teflon sleeves, or equivalent, are used. Alternatively, other types of stopcock grease may be used, subject to the approval of the department.

(ii) Sample recovery. Washing solvent. Either acetone or distilled water may be used for sample recovery. If acetone is used for washing solvent, then reagent grade, less than 0.001% residue, in glass bottles is required. Acetone from metal containers generally has a high residue blank and shall not be used. Suppliers sometimes transfer acetone to glass bottles from metal containers; thus, acetone blanks shall be run prior to field use and only acetone with low blank values (less than 0.001%) shall be used. A blank value of more than 0.001% of the weight of acetone used shall not be subtracted from the sample weight.

If distilled water is used for washing solvent, use distilled water with less than 0.001% residue. Run blanks before field use to eliminate a high blank on test samples.

(iii) Analysis. Two reagents are required for the analysis:

(A) Solvent. Same as paragraph (ii) of this subdivision for quantitative transfer.

(B) Desiccant. Anhydrous calcium sulfate, indicating type. Alternatively, other types of desiccants may be used, subject to the approval of the department.

(d) The following provisions apply to procedure:

(i) Sampling. The complexity of this method is such that, in order to obtain reliable results, testers shall be trained and experienced with the test procedures. Sampling shall comply with the following provisions:

(A) Pretest preparation. All the components shall be maintained and calibrated according to the applicable procedures described in APTD-0576, unless otherwise specified in this rule.

Weigh several 200 to 300 g portions of silica gel in airtight containers to the nearest 0.5 g. Record the total weight of the silica gel plus container on each container. As an alternative, the silica gel need not be preweighed, but may be weighed directly in its impinger or sampling holder just prior to train assembly.

Check filters visually against light for irregularities, flaws, pinhole leaks, or cracks. Label filters of the proper size on the back side using numbering machine ink. As an alternative, label the shipping containers (subdivision (b)(ii)(D) of this rule) and keep the filters in these containers at all times, except during sampling and weighing.

Dry the filters in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1 hour in a desiccator containing anhydrous calcium sulfate, and individually weigh and record their weights to the nearest 0.1 mg. During the weighing, the filters shall not be exposed to the laboratory atmosphere for a period of more than 2 minutes and a relative humidity above 50%. Procedures, other than those specified, that account for relative humidity effects may be used, subject to the approval of the department.

(B) Preliminary determinations. Select the sampling site and the minimum number of sampling points according to method 1 or as specified by the department. Determine the stack pressure, temperature, and the range of velocity heads using method 2; it is recommended that a leak check of the pitot lines (see method 2, section 3.1) be performed. Determine the moisture content using approximation method 4, or its alternatives, for the purpose of making isokinetic sampling rate settings. Determine the stack gas dry molecular weight, as described in method 2, section 3.6; if integrated method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the particulate sample run.

Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates. During the run, do not change the nozzle size. Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see section 2.2 of method 2).

Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, consider sampling from opposite sides of the stack to reduce the length of probes.

Select a total sampling time greater than or equal to the minimum total sampling time specified in the test procedures for the specific industry so that the sampling time per point is not less than 5 minutes, unless approved by the department, or some greater time interval as specified by the department, and so that the sample volume taken, corrected to standard conditions, exceeds the required minimum total gas sample volume. The latter is based on an approximate average sampling rate.

It is recommended that the number of minutes sampled at each point be an integer or an integer plus 1/2 minute to avoid timekeeping errors.

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In some circumstances, such as in batch cycles, it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas sample volumes. In these cases, the department's approval shall first be obtained.

(C) Preparation of collection train. During preparation and assembly of the sampling train, keep all openings where contamination can occur covered until just before assembly or until sampling is about to begin.

Place 100 ml of water in the first impinger, leave the second impinger empty, and transfer approximately 200 to 300 g of preweighed silica gel from its container to the third impinger. More silica gel may be used, but care should be taken to ensure that it is not entrained and carried out from the impinger during sampling. Place the container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

Using tweezers or clean disposable surgical gloves, place a labeled (identified) and weighed filter in the filter holder. Be sure that the filter is properly centered and the gasket properly placed so as to prevent the sample gas stream from circumventing the filter. Check the filter for tears after assembly is completed.

When glass liners are used, install the selected nozzle using a Viton A O-ring when stack temperatures are less than 260 degrees Centigrade (500 degrees Fahrenheit) and an asbestos string gasket when temperatures are higher. See APTD-0576 for details. Other connecting systems using either 310 stainless steel or teflon ferrules may be used. When metal liners are used, install the nozzle in the same manner as for glass liners or by a leak-free direct mechanical connection. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

Set up the train as in figure 103. If necessary, use a very light coat of silicone grease on all ground glass joints. Grease only the outer portion (see APTD-0576) to avoid the possibility of contamination by the silicone grease.

Place crushed ice around the impingers.

(D) Leak check procedures:

(1) Pretest leak check. A pretest leak check is strongly recommended, but not required, to prevent invalid sampling and wasted time. If the tester opts to conduct the pretest leak check, the following procedure shall be used:

After the sampling train has been assembled, turn it on and set the filter and probe heating systems at the desired operating temperatures. Allow time for the temperatures to stabilize. If a Viton A O-ring or other leak-free connection is used in assembling the probe nozzle to the probe liner, leakcheck the train at the sampling site by plugging the nozzle and pulling a 380 mm Hg (15 in. Hg) vacuum. A lower vacuum may be used, if it is not exceeded during the test.

If an asbestos string is used, do not connect the probe to the train during the leak check. Instead, leak check the train by first plugging the inlet to the filter holder (cyclone, if applicable) and pulling a 380 mm Hg (15 in. Hg) vacuum. A lower vacuum may be used if it is not exceeded during the test. Then connect the probe to the train and leak check at about 25 mm Hg (1 in. Hg) vacuum; alternatively, the probe may be leak checked with the rest of the sampling train, in 1 step, at 380 mm Hg (15 in. Hg) vacuum. Leakage rates in excess of 4% of the average sampling rate or 0.00057 m<sup>3</sup>/min (0.02 cfm), whichever is less, are unacceptable.

The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with the bypass valve fully open and the coarse adjust valve completely closed. Partially open the coarse adjust valve and slowly close the bypass valve until the desired vacuum is reached. Do not reverse the direction of the bypass valve; this will cause water to back up into the filter holder. If the desired vacuum is exceeded, either leak check at this higher vacuum or end the leak check and start over.

When the leak check is completed, first slowly remove the plug from the inlet to the probe, filter holder, or cyclone (if applicable) and immediately turn off the vacuum pump. This prevents the water in the impingers from being forced backward into the filter holder and prevents silica gel from being entrained backward into the third impinger.

(2) Leak checks during sample run. If, during the sampling run, a component (such as a filter assembly or impinger) change becomes necessary, a leak check shall be conducted immediately before the change is made. The leak check shall be done according to the procedure outlined in paragraph (i)(D)(1) of this subdivision, except that it shall be done at a vacuum equal to or greater than the maximum value recorded up to that point in the test. If the leakage rate is found to be not more than 0.00057 m<sup>3</sup>/min (0.02 cfm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered; if, however, a higher leakage rate is obtained, the tester shall either record the leakage rate and plan to correct the sample volume, as shown in subdivision (f)(iii) of this rule, or shall void the sampling run.

Immediately after component changes, leak checks are optional; if such leak checks are done, the procedure outlined in paragraph (i)(D)(1) of this subdivision shall be used.

(3) Post-test leak check. A leak check is mandatory at the conclusion of each sampling run. The leak check shall be done in accordance with the procedures outlined in paragraph (i)(D)(1) of this subdivision, except that it shall be conducted at a vacuum equal to or greater than the maximum value reached during the sampling run. If the leakage rate is found to be not more than 0.00057 m<sup>3</sup>/min (0.02 cfm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered. If, however, a higher leakage rate is obtained, the tester

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shall either record the leakage rate and correct the sample volume, as shown in subdivision (f)(iii) of this rule, or shall void the sampling run.

(E) Particulate train operation. During the sampling run, maintain an isokinetic sampling rate that is within 10% of true isokinetic, unless otherwise specified by the department.

For each run, record the data required on a data sheet such as the one shown in figure 104. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak check, and when sampling is halted. Take other readings required by figure 104 at least once at each sample point during each time increment, and take additional readings when significant changes (20% variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

Clean the portholes prior to the test run to minimize the chance of sampling deposited material. To begin sampling, remove the nozzle cap and verify that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs that aid in the rapid adjustment of the isokinetic sampling rate without excessive computations are available. These nomographs are designed for use when the type S pitot tube coefficient is  $0.85 \pm 0.02$  and the stack gas equivalent density (dry molecular weight) is equal to  $29 \pm 4$ . APTD-0576 details the procedure for using the nomographs. If  $C_p$  and  $M_d$  are outside the above stated ranges, do not use the nomographs unless appropriate steps (see subdivision (g)(iv) of this rule) are taken to compensate for the deviations.

When the stack is under significant negative pressure (height of impinger stem), take care to pull low flow when inserting the probe into the stack to prevent water from backing into the sample tubing and to avoid pulsation through the filter and possible loss of materials.

When the probe is in position, block off the openings around the probe and porthole to prevent unrepresentative dilution of the gas stream.

Traverse the stack cross section, as required by method 1 or as specified by the department, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the portholes; this minimizes the chance of extracting deposited material.

During the test run, add more ice and, if necessary, salt to maintain a temperature of less than 20 degrees Centigrade (68 degrees Fahrenheit) at the condenser/silica gel outlet. Also, periodically check the level and zero of the manometer.

If the pressure drop across the filter becomes too high and makes isokinetic sampling difficult to maintain, the filter may be replaced in the midst of a sample run. It is recommended that another complete filter assembly be used rather than attempting to change the filter itself. Before a new filter assembly is installed, conduct a leak check (see paragraph (i)(D)(2) of this subdivision). The total particulate weight shall include the summation of all filter assembly catches.

A single train shall be used for the entire sample run, except in cases where simultaneous sampling is required in 2 or more separate ducts, at 2 or more different locations within the same duct, or where equipment failure necessitates a change of trains. In all other situations, the use of 2 or more trains shall be subject to the approval of the department.

Note that when 2 or more trains are used, separate analyses of the front-half catches from the individual trains may be combined, as may the impinger catches, and 1 analysis of the front-half catch and 1 analysis of impinger catch may be performed. Consult with the department for details concerning the calculation of results when 2 or more trains are used.

At the end of the sample run, turn off the coarse adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry-gas meter reading, and conduct a post-test leak check, as outlined in paragraph (i)(D)(3). Also, leak check the pitot lines as described in method 2, section 3.1; the lines shall pass this leak check to validate the velocity head data.

(F) Calculation of percent isokinetic. Calculate percent isokinetic (see subdivision (f) of this rule) to determine whether the run was valid or whether another test run should be made. If there was difficulty in maintaining isokinetic rates due to source conditions, consult with the department for possible variance on the isokinetic rates.

(ii) Sample recovery. Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool.

When the probe can be safely handled, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over it to prevent losing or gaining particulate matter. Do not cap off the probe tip tightly while the sampling train is cooling down as this creates a vacuum in the filter holder and draws water from the impingers into the filter holder.

Before moving the sample train to the cleanup site, remove the probe from the sample train, wipe off the silicone grease, and cap the open outlet of the probe. Be careful not to lose any condensate that might be present. Wipe off the silicone grease from the filter inlet where the probe was fastened and cap it. Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used between the first impinger or condenser and the filter holder, disconnect the line at the filter holder and let any condensed water or liquid drain into the impingers or condenser. After wiping off the silicone grease, cap off the filter holder outlet and impinger inlet. Ground-glass stoppers, plastic caps, or serum caps may be used to close

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these openings.

Transfer the probe and filter-impinger assembly to the cleanup area. This area shall be clean and protected from the wind so that the chances of contaminating or losing the sample are minimized.

Save a portion of the solvent used for cleanup as a blank. Take 200 ml of this solvent directly from the wash bottle being used and place it in a glass sample container labeled "solvent blank."

Inspect the train prior to and during disassembly and note any abnormal conditions. Treat the samples as follows:

Container Nos. 1, 1A. Carefully remove the filters from the filter holders and place in their identified containers. Use a pair of tweezers or clean disposable surgical gloves, or both, to handle the filters. Carefully transfer to the container any particulate matter or filter fibers, or both, that adhere to the filter holder gasket by using a dry nylon bristle brush or sharp-edged blade, or both. Seal the container.

Container No. 2. Taking care to see that dust on the outside of the probe or other exterior surfaces does not get into the sample, the testor shall quantitatively recover from particulate matter or any condensate from the nozzle, probe fitting, probe liner, and from both filter holders by washing these components with solvent and placing the wash in a glass container.

Perform the solvent rinses as follows:

Carefully remove the probe nozzle and clean the inside surface by rinsing with solvent from a wash bottle and brushing with a nylon bristle brush. Brush until the solvent rinse shows no visible particles and then make a final rinse of the inside surface with solvent.

Brush and rinse the inside parts of the Swagelok fitting with solvent in a similar way until no visible particles remain.

Rinse the probe liner with solvent by tilting and rotating the probe while squirting solvent into its upper end so that all inside surfaces are wetted with acetone. Let the solvent drain from the lower end into the sample container. A glass or polyethylene funnel may be used to aid in transferring liquid washes to the container. Follow the solvent rinse with a probe brush. Hold the probe in an inclined position and squirt solvent into the upper end as the probe brush is being pushed with a twisting action through the probe; hold a sample container underneath the lower end of the probe and catch any solvent and particulate matter that is brushed from the probe. Run the brush through the probe 3 or more times until no visible particulate matter is carried out with the solvent or until none remains in the probe liner on visual inspection. With stainless steel or other metal probes, run the brush through, in the above prescribed manner, not less than 6 times, since metal probes have small crevices in which particulate matter can be entrapped. Rinse the brush with solvent and quantitatively collect these washings in the sample container. After the brushing, make a final solvent rinse of the probe as described above.

It is recommended that 2 people be used to clean the probe to minimize sample losses. Between sampling runs, keep brushes clean and protected from contamination.

After ensuring that all joints have been wiped clean of silicone grease, clean the inside of both filter holders by rubbing the surfaces with a nylon bristle brush and rinsing with solvent. Rinse each surface 3 times, or more if needed, to remove visible particulate. Make a final rinse of the brush and filter holder.

After all solvent washings and particulate matter have been collected in the sample container, tighten the lid on the sample container so that solvent will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether or not leakage occurred during transport. Label the container to clearly identify its contents.

Container No. 3. Note the color of the indicating silica gel to determine if it has been completely spent and make a notation of its condition. Transfer the silica gel from the third impinger to its original container and seal. A funnel may make it easier to pour the silica gel without spilling it. A rubber policeman may be used as an aid in removing the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, follow the procedure for container No. 3 in paragraph (iii) of this subdivision.

Impinger water. Treat the impingers as follows: Make a notation of any color or film in the liquid catch. Measure the liquid that is in the first 2 impingers to within  $\pm 1$  ml by using a graduated cylinder or by weighing it to within  $\pm 1.0$  g by using a balance if none is available. Record the volume or weight of liquid present. This information is required to calculate the moisture content of the effluent gas.

Discard the liquid after measuring and recording the volume or weight, unless analysis of the impinger catch is required (see subdivision (b)(i)(G) of this rule).

If a different type of condenser is used, measure the amount of moisture condensed either volumetrically or gravimetrically.

Whenever possible, containers shall be shipped in a manner that keeps them upright at all times.

(iii) Analysis. Record the data required on a sheet such as the one shown in figure 106. Handle each sample container as follows:

Container Nos. 1, 1A. Analyze and report each filter separately. Transfer the filter and any loose particulate from the sample container to a tared-glass weighing dish. Dry the filter in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1 hour in a desiccator containing anhydrous calcium sulfate, and weigh and record its weight to the nearest 0.1 mg. During the weighing, the filter shall not be exposed to the laboratory atmosphere for a period of

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more than 2 minutes or a relative humidity above 50%. Procedures, other than those specified, that account for relative humidity effects may be used, subject to the approval of the department. The method used for the drying and weighing of filters shall be consistent before and after the test.

Container No. 2. Note the level of liquid in the container and confirm on the analysis sheet whether or not leakage occurred during transport. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the department, to correct the final results.

Measure the liquid in this container either volumetrically to  $\pm 1$  ml or gravimetrically to  $\pm 1.0$  g. Transfer the contents to a tared 250-ml beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

Container No. 3. Weigh the spent silica gel, or silica gel plus impinger, to the nearest 0.5 g using a balance. This step may be conducted in the field.

"Solvent blank" container. Measure solvent in this container either volumetrically or gravimetrically. Transfer the contents to a tared 250-ml beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

If acetone is used, the contents of container No. 2, as well as the acetone blank container, may be evaporated at temperatures higher than ambient. If evaporation is done at an elevated temperature, the temperature shall be closely supervised, and the contents of the beaker shall be swirled occasionally to maintain an even temperature. Use extreme care, as acetone is highly flammable and has a low flash point.

(e) Calibration. Maintain a laboratory log of all calibrations. Calibrations shall comply with all of the following provisions:

(i) Probe nozzle. Probe nozzles shall be calibrated before their initial use in the field. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in.). Make 3 separate measurements using different diameters each time and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in.). When nozzles become nicked, dented, or corroded, they shall be reshaped, sharpened, and recalibrated before use. Each nozzle shall be permanently and uniquely identified.

(ii) Pitot tube. The type S pitot tube assembly shall be calibrated according to the procedure outlined in section 4 of method 2.

(iii) Metering system. Before its initial use in the field, the metering system shall be calibrated according to the procedure outlined in APTD-0576. Instead of physically adjusting the dry-gas meter dial readings to correspond to the wet-test meter readings, calibration factors may be used to mathematically correct the gas meter dial readings to the proper values. Before calibrating the metering system, it is suggested that a leak check be conducted. For metering systems having diaphragm or rotary pumps, the normal leak check procedure will not detect leakages within the pump. For these cases, the following leak check procedure is suggested: Make a 10-minute calibration run at  $0.00057 \text{ m}^3/\text{min}$  (0.02 cfm); at the end of the run, take the difference of the measured wet-test meter and dry-gas meter volumes; divide the difference by 10 to get the leak rate. The leak rate shall not exceed  $0.00057 \text{ m}^3/\text{min}$  (0.02 cfm).

After each field use, the calibration of the metering system shall be checked by performing 3 calibration runs at a single, intermediate orifice setting, based on the previous field test, with the vacuum set at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet-test meter and the inlet of the metering system. Calculate the average value of the calibration factor. If the calibration has changed by more than 5%, recalibrate the meter over the full range of orifice settings, as outlined in APTD-0576.

Alternatively, a spirometer may be substituted for a wet-test meter in the above mentioned calibration procedures.

Alternative procedures, such as using the orifice meter coefficients, may be used, subject to the approval of the department.

If the dry-gas meter coefficient values obtained before and after a test series differ by more than 5%, the test series shall be performed using whichever meter coefficient value (before or after) gives the lower value of total sample volume.

(iv) Probe heater calibration. The probe heating system shall be calibrated before its initial use in the field according to the procedures outlined in APTD-0576. Probes constructed according to APTD-0581 need not be calibrated if the calibration curves in APTD-0576 are used.

(v) Temperature gauges. Use the procedure in section 4.3 of method 2 to calibrate in-stack temperature gauges. Dial thermometers, such as those used for the dry-gas meter and condenser outlet, shall be calibrated against mercury-in-glass thermometers.

(vi) Leak check of metering system shown in figure 103. That portion of the sampling train from the pump to the orifice meter shall be leak checked before initial use and after each shipment. Leakage after the pump will result in less volume being recorded than is actually sampled. The following procedure is suggested (see figure 107): Close the main valve on the meter box. Insert a 1-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the

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low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13 to 18 cm (5 to 7 in.) water column by blowing into the rubber tubing. Pinch off the tubing and observe the manometer for 1 minute. A loss of pressure on the manometer indicates a leak in the meter box; leaks, if present, shall be corrected.

(vii) Barometer. Calibrate against a mercury barometer.

(f) Calculations. When carrying out calculations, retain at least 1 extra decimal figure beyond that of the acquired data. Round off figures after the final calculation. Other forms of the equations may be used if they give equivalent results. All of the following provisions apply to calculations:

(i) Nomenclature:

$A_n$  = Cross-sectional area of nozzle,  $m^2$  ( $ft^2$ )

$A$  = Cross-sectional area of stack or flue at the point of sampling,  $ft.^2$ .

$B_{ws}$  = Water vapor in the gas stream, proportion by volume, expressed as a fraction.

$B_{wi}$  = Percent water vapor in gas entering source particulate control device, determined by method 4.

$B_{wo}$  = Percent water vapor in gas exiting source particulate control device.

$C_a$  = Wash blank residue concentration,  $mg/g$ .

$C_s$  = Concentration of particulate matter in stack gas, pounds per 1,000 pounds of actual stack gas.

$C_{sD}$  = Concentration of particulate matter in stack gas, moisture excluded, pounds per 1,000 pounds of dry stack gas.

$C_{s50}$  = Concentration of particulate matter corrected to 50% excess air, pounds per 1,000 pounds of stack gas.

$C_{s50D}$  = Concentration of particulate matter corrected to 50% excess air, excluding any water addition from a collector, pounds per 1,000 pounds of stack gas.

$E$  = Mass emission rate of particulate,  $lb/hr$ .

$F_{50}$  = Concentration conversion factor to 50% excess air with no moisture alterations in exhaust.

$F_{50D}$  = Concentration conversion factor to 50% excess air, excluding any moisture added to exhaust gas by pollution collection system.

$F_D$  = Concentration conversion factor to dry basis, excluding any water in the stack gas.

$I$  = Percent of isokinetic sampling.

$L_a$  = Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to  $0.00057 m^3/min$  ( $0.02 cfm$ ) or 4% of the average sampling rate, whichever is less.

$L_i$  = Individual leakage rate observed during the leak check conducted BEFORE the "ith" component change ( $i = 1, 2, 3 \dots n$ ),  $m^3/min$  ( $cfm$ ).

$L_p$  = Leakage rate observed during the post-test leak check,  $m^3/min$  ( $cfm$ ).

$M_d$  = Molecular weight of dry stack gas,  $g/g$  mole ( $lb/lb$ -mole), calculated by method 3, equation 3-2, using data from integrated method 3.

$m_n$  = Total amount of particulate matter collected,  $mg$ .

$M_w$  = Molecular weight of water,  $18.0 g/g$ -mole ( $18.0 lb/lb$ -mole).

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$m_a$  = Mass of residue of solvent after evaporation, mg.

$m_g$  = Total weight of gas samples through nozzle, lb.

$P_{bar}$  = Barometric pressure at the sampling site, mm Hg (in. Hg).

$P_s$  = Absolute stack gas pressure.

$P_{std}$  = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

$R$  = Ideal gas constant, 0.06236 mm Hg-m<sup>3</sup>/°K-g-mole (21.85 in. Hg-ft<sup>3</sup>/°R-lb-mole).

$T_m$  = Absolute average dry-gas meter temperature (see figure 104), °K (°R).

$T_s$  = Absolute average stack gas temperature (see figure 104), °K (°R).

$T_{std}$  = Standard absolute temperature, 294.1 °K (530 °R).

$V_a$  = Volume of solvent blank, ml.

$V_{aw}$  = Volume of solvent used in wash, ml.

$V_{lc}$  = Total volume of liquid collected in impingers and silica gel (see figure 106), ml.

$V_m$  = Volume of gas sample as measured by dry-gas meter, dcm (dcf).

$V_{m(std)}$  = Volume of gas sample measured by the dry-gas meter, corrected to standard conditions, dscm (dscf).

$V_{w(std)}$  = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf).

$V_s$  = Stack gas velocity, calculated by method 2, equation 2-9, using data obtained from method 5, m/sec (ft./sec).

$W_a$  = Weight of residue in solvent wash, mg.

$Y$  = Dry-gas meter calibration factor.

$\Delta H$  = Average pressure differential across the orifice meter (see figure 104), mm H<sub>2</sub>O (in. H<sub>2</sub>O).

%O<sub>2</sub> = Percent oxygen in stack gas by volume (dry basis).

%N<sub>2</sub> = Percent nitrogen in stack gas by volume (dry basis).

$p_a$  = Density of solvent, mg/ml.

$p_{s(std)}$  = Density of all sampled gas at standard conditions, lb/ft.<sup>3</sup>.

$p_w$  = Density of water, 0.9982 g/ml (0.002201 lb/ml).

$\Theta$  = Total sample time, min.

$\Theta_1$  = Sample time, interval, from the beginning of a run until the first component change, min.

$\Theta_i$  = Sampling time interval, between 2 successive component changes beginning with the interval between the first and second changes, min.

$\Theta_p$  = Sampling time interval, from the final (n<sup>th</sup>) component change until the end of the sampling run, min.



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13.6 = Specific gravity of mercury.

60 = Sec/min.

100 = Conversion to percent.

386.9 = Cubic feet per lb-mole of ideal gas at standard conditions.

453.6 = Conversion of pounds to grams.

3600 = Conversion of hours to sec.

1000 = Conversion of 1000 lb units to lb units.

(ii) Average the dry-gas meter temperature and average the orifice pressure drop. See data sheet (figure 104).

(iii) Dry gas volume. Correct the sample volume measured by the dry-gas meter to standard conditions (21.1 degrees Centigrade, 760 mm Hg or 70 degrees Fahrenheit, 29.92 in. Hg) by using equation 5-1.  
equation 5-1

$$V_{m(std)} = \frac{V_m Y T_{std} (P_{bar} + \Delta H / 13.6)}{T_m P_{std}} = K_1 V_m Y \frac{(P_{bar} + \Delta H / 13.6)}{T_m}$$

Where:

$K_1 = 0.3869 \text{ } ^\circ\text{K/mm Hg}$  for metric units.

$= 17.71 \text{ } ^\circ\text{R/in. Hg}$  for English units.

Equation 5-1 can be used as written. However, if the leakage rate observed during any of the mandatory leak checks (for example, the post-test leak check or leak checks conducted prior to component changes) exceeds  $L_a$ , equation 5-1 shall be modified as follows:

(A) Case I. No component changes made during sampling run. In this case, replace  $V_m$  in equation 5-1 with the expression:

$$V_m - (L_p - L_a) \theta$$

(B) Case II. One or more component changes made during the sampling run. In this case, replace  $V_m$  in equation 5-1 by the expression:

$$V_m - (L_i - L_a) \theta - \sum_{i=2}^n (L_i - L_a) \theta - (L_p - L_a) \theta_p$$

and substitute only for those leakage rates ( $L_i$  or  $L_p$ ) that exceed  $L_a$ .

(iv) Volume of water vapor.

equation 5-2

$$V_{w(std)} = V_{lc} (p_w / M_w) (R T_{std} / P_{std}) = K_2 V_{lc}$$

Where:

$K_2 = 0.001338 \text{ m}^3/\text{ml}$  for metric units.

$= 0.04733 \text{ ft.}^3/\text{ml}$  for English units.

(v) Moisture content.

equation 5-3

$$B_{ws} = V_{w(std)} / (V_{m(std)} + V_{w(std)})$$

In saturated or water droplet-laden gas streams, 2 calculations of the moisture content of the stack gas shall be made: 1 from the impinger analysis (equation 5-3), and a second from the assumption of saturated conditions. The lower of the 2 values of  $B_{ws}$  shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the note of section 1.2 of method 4. For the purpose of this method, the average stack gas temperature from figure 104 may be used to make the determination, if the accuracy of the in-stack temperature sensor is  $\pm 1$  degree Centigrade (2 degrees Fahrenheit).

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(vi) Solvent blank concentration.

equation 5-4

$$C_a = m_a / (V_a P_a)$$

(vii) Solvent wash blank.

equation 5-5

$$W_a = C_a V_{aw} P_a$$

(viii) Total particulate weight. Determine the total particulate catch from the sum of the weights obtained from containers 1, 1A, and 2 less the wash solvent blank (see figure 106).

Refer to subdivision (d)(i)(E) of this rule to assist in the calculation of results involving 2 or more pairs of filters or 2 or more sampling trains.

(ix) Sampled gas density. Determine the density of the gas sampled from the stack, at standard conditions (lb/ft.<sup>3</sup>).

equation 5-6

$$P_{s(std)} = (M_d (1 - B_{ws}) + M_w B_{ws}) / 386.9$$

(x) Total weight of gas sampled (lbs).

equation 5-7

$$m_g = (V_{m(std)} + V_{w(std)}) P_{s(std)}$$

(xi) Particulate concentration (lbs/1000 lbs).

equation 5-8

$$C_s = m_n / (453.6 m_g)$$

(xii) Excess air and moisture correction factors:

(A) Correction factor to 50% excess air for those sources with or without any particulate collector where no increase in moisture content of the exhaust gas occurs after the process and before the point of sampling.

equation 5-9

$$F_{50} = \frac{M_d + 18 B_{wo} / (100 - B_{wo})}{0.1826 \% N_2 - 2.0592 \% O_2 + M_d + 18 B_{wo} / (100 - B_{wo})}$$

(B) Correction factor to 50% excess air for those sources with a wet collection device (scrubber) that increases the moisture content of the exhaust gas after the process and before the point of sampling.

equation 5-10

$$F_{50D} = \frac{M_d + 18 B_{wo} / (100 - B_{wo})}{0.1826 \% N_2 - 2.0592 \% O_2 + M_d + 18 B_{wi} / (100 - B_{wi})}$$

(C) Correction factor to convert the actual concentration,  $C_s$ , to dry conditions.

equation 5-11

$$F_D = \frac{M_d + 18 B_{wo} / (100 - B_{wo})}{M_d}$$

(xiii) Converted particulate concentrations, where applicable under the department's rules or permit.

equation 5-12

$$C_{s50} = C_s F_{50}$$

equation 5-13

$$C_{s50D} = C_s F_{50D}$$

equation 5-14

$$C_{sD} = C_s F_D$$

(xiv) Mass emission rate (lb/hr).

equation 5-15

$$E = \frac{3600 A V_s C_s P_s T_{std} P_{s(std)}}{1000 T_s P_{std}} = K_3 A V_s C_s P_s P_{s(std)} / T_s$$

Where:

$K_3 = 63.77$  for English units.

(xv) Isokinetic variation:

(A) Calculation from raw data.

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equation 5-16

$$I = \frac{100 T_s (K_4 V_{lc} + (V_m / T_m)(P_{bar} + \Delta H / 13.6))}{60 \theta V_s P_s A_n}$$

Where:

$K_4 = 0.003458$  mm Hg -  $m^3$  ml -  $^{\circ}$ K for metric units.

$= 0.002672$  in. Hg -  $ft.^3$ /ml -  $^{\circ}$ R for English units.

(B) Calculation from intermediate values.

equation 5-17

$$I = \frac{T_s V_{m(std)} P_{std} 100}{T_{std} V_s \theta A_n P_s 60(1 - B_{ws})} = K_5 \frac{T_s V_{m(std)}}{P_s V_s A_n \theta (1 - B_{ws})}$$

Where:

$K_5 = 4.307$  for metric units.

$= 0.09409$  for English units.

(xvi) Acceptable results. If  $90\% \leq I \leq 110\%$ , the results are acceptable. If the results are low in comparison to the standard and I is beyond the acceptable range, or if I is less than 90%, the department may opt to accept the results. Otherwise, reject the results and repeat the test.

(g) Bibliography:

(i) Federal Register, Volume 42, No. 160, Part 60, Chapter 1, Title 40, Appendix A, Method 5. August 18, 1977.

(ii) Martin, Robert M. Construction Details of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0581. April, 1971.

(iii) Rom, Jerome J. Maintenance, Calibration, and Operation of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0576. March, 1972.

(iv) Shigehara, R. T. "Adjustments in the EPA Nomograph for Different Pitot Tube Coefficients and Dry Molecular Weights." Stack Sampling News 2:4-11. October, 1974.

(v) Guidelines for Source Testing of Particulate. Michigan Department of Natural Resources, Air Quality Division. June 1, 1977.

History: 1985 MR 2, Eff. Feb. 22, 1985; 1992 MR 9, Eff. Oct. 31, 1992; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2013 Reference test method 5D.**

Rule 1013. Reference test method 5D, testing of steel manufacturing sources, reads as follows:

(a) General description. Emission testing procedures shall follow the methodology specified in R 336.2004(1)(c) and (d) and R 336.2012, unless otherwise provided in this rule.

(b) Coke battery pushing emission control equipment outlet test procedure for scrubbers. Outlet emission tests for any scrubber emission control equipment controlling coke battery emissions shall be conducted as follows:

(i) The pushing emission control system is operated on a batch type process and shall be tested as such using the reference test methods specified in subdivision (a) of this rule.

(ii) Each sampling point shall be sampled for 1 cycle operation, which is defined as beginning when the coke guide and snorkels are engaged and continuing until the quench car leaves the hood.

(iii) For a shed, the sampling period shall begin with the first movement of coke and shall end when the car enters the quench tower.

(iv) Integrated gas samples shall be taken over the entire test period. The samples shall be analyzed for carbon monoxide, carbon dioxide, oxygen, and nitrogen by means of an Orsat analyzer. The sampling and sample analysis shall be performed in accordance with R 336.2004(1)(c). The average values from the 3 samples shall be used in determining the dry molecular weight of the exhaust gas. If a complete test is not performed during the day, at least 1 sample shall be taken.

(v) Based on design and previous data, saturated conditions shall be assumed. The moisture content shall be calculated as per R 336.2004(1)(d), based on stack conditions during the preliminary and sampling traverses.

(vi) The stack sampling equipment and procedures as described in method 5C shall be used in performing a particulate emission test, with the following variations:

(A) Due to the varying time required for pushing operations, an integer sampling time increment shall not be required.

(B) Because of the shorter sampling periods at each sampling point, a specific gas volume cannot be guaranteed. Therefore, an average sampling rate of not less than 0.90 dry standard cubic feet per minute shall be used during each sampling run.

(C) A stainless steel probe liner after the nozzle may be used.

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- (D) Glass or glass-lined stainless steel tubing and a glass cyclone between the probe and filter holder may be used.
- (E) The probe and filter heating system may be heated at  $248 \pm 25$  degrees Fahrenheit.
- (c) Basic oxygen furnace primary emissions control equipment outlet test procedure. Outlet emission tests for any emission control equipment controlling only the primary emissions from a basic oxygen furnace shall be conducted as follows:
- (i) The testing program shall consist of 3 valid sampling runs. A sampling run is the composite of those portions of 4 heats starting with oxygen blowing and ending not more than 180 seconds following the last oxygen blow or the beginning of the tap, whichever occurs first. Each process cycle shall be used to obtain the sample for 1 quadrant of the traverse.
- (ii) When testing a wet scrubber outlet, saturated conditions shall be assumed and moisture content shall be calculated based on stack conditions during the preliminary and sampling traverses.
- (iii) The particulate emission rate shall be determined as specified in reference test method 5C, with the following variations:
- (A) A stainless steel probe liner after the nozzle may be used.
- (B) Glass or glass-lined stainless steel tubing and a glass cyclone between the probe and filter holder may be used.
- (C) The probe and filter heating system may be heated to  $248 \pm 25$  degrees Fahrenheit.
- (d) Basic oxygen furnace secondary emissions control equipment outlet test procedure. Outlet emission tests for any emission control equipment controlling only the secondary emissions from a basic oxygen furnace shall be conducted as follows:
- (i) The testing program shall consist of 3 valid sampling runs. A sampling run shall be defined as the composite of the following portions of 4 heats:
- (A) Charging.
- (B) Tapping.
- (C) Turndown.
- (D) Slagging.
- (E) The first 5 minutes of oxygen blowing for those systems with a separate secondary collector.
- (ii) When testing a wet scrubber outlet, saturated conditions shall be assumed and moisture content shall be calculated based on stack conditions during the preliminary and sampling traverses.
- (iii) The particulate emission rate shall be determined as specified in reference test method 5C, with the following variations:
- (A) A stainless steel probe liner after the nozzle may be used.
- (B) Glass or glass-lined stainless steel tubing and a glass cyclone between the probe and filter holder may be used.
- (C) The probe and filter heating system may be heated to  $248 \pm 25$  degrees Fahrenheit.
- (e) Basic oxygen furnace primary and secondary emissions control equipment outlet test procedures. Outlet emission tests for any emission control equipment controlling both the primary and secondary emissions from a basic oxygen furnace shall be conducted as follows:
- (i) One vessel:
- (A) For testing of primary control equipment that captures secondary emissions from a single vessel, the testing program shall consist of 3 valid sampling runs. A sampling run is the composite of the following portions of 8 heats:
- (1) Charging.
- (2) Oxygen blowing.
- (3) Tapping.
- (4) Turndown.
- (5) Slagging.
- Four heats are to be sampled only during oxygen blowing, with each heat used to obtain the sample from 1 quadrant. The remaining 4 heats are to be sampled only during the portions of the heat other than oxygen blowing, with each heat used to obtain the sample from 1 quadrant.
- (B) When testing a wet scrubber outlet, saturated conditions shall be assumed and moisture content shall be calculated based on stack conditions during the preliminary and sampling traverses.
- (C) The particulate emission rate shall be determined as specified in reference test method 5C, with the following variations:
- (1) A stainless steel probe liner after the nozzle may be used.
- (2) Glass or glass-lined stainless steel tubing and a glass cyclone between the probe and filter holder may be used.
- (3) The probe and filter heating system may be heated to  $248 \pm 25$  degrees Fahrenheit.
- (ii) More than one vessel:
- (A) For testing of control equipment that captures both primary and secondary emissions from more than 1 vessel, the testing program shall consist of 3 valid sampling runs. A sampling run is the composite of the following portions of 4 heats for 1 or more vessels:
- (1) Charging.
- (2) Oxygen blowing.
- (3) Tapping.
- (4) Turndown.

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(5) Slagging.

At least 1 heat shall be used to obtain the sample from each quadrant of the traverse.

(B) When testing a wet scrubber outlet, saturated conditions shall be assumed and moisture content shall be calculated based on stack conditions during the preliminary and sampling traverses.

(C) The particulate emission rate shall be determined as specified in reference test method 5C, with the following variations:

(1) A stainless steel probe liner after the nozzle may be used.

(2) Glass or glass-lined stainless steel tubing and a glass cyclone between the probe and filter holder may be used.

(3) The probe and filter heating system may be heated to  $248 \pm 25$  degrees Fahrenheit.

(f) Blast furnace casthouse air-cleaning device outlet test procedure. Outlet emission tests for any air-cleaning device controlling fugitive emissions from a blast furnace casthouse shall be conducted as follows:

(i) The testing program shall consist of 3 sampling runs. A sampling run shall be performed during a 2-hour period, sampling only when casting takes place. If 50 dry standard cubic feet are not sampled during this period, the sampling run shall be extended so as to fulfill this condition.

(ii) The particulate emission rate shall be determined as specified in reference test method 5C, with the following variations:

(A) A stainless steel probe liner after the nozzle may be used.

(B) Glass or glass-lined stainless steel tubing and a glass cyclone between the probe and filter holder may be used.

(C) The probe and filter heating system may be heated to  $248 \pm 25$  degrees Fahrenheit.

(g) Coke oven combustion stack test procedures. Emissions from any coke oven combustion stack shall be tested as follows:

(i) The testing program shall consist of 3 valid sampling runs.

(ii) Saturated conditions shall be assumed for stacks controlled by wet scrubbers. The moisture content shall be calculated as per R 336.2004(1)(d) based on stack conditions during the preliminary and sampling traverses.

(iii) The stack sampling equipment and procedures described in method 5C shall be used in performing a particulate emission test with the following variations:

(A) A stainless steel probe liner after the nozzle may be used.

(B) Heated flexible teflon tubing and a glass cyclone between the probe and filter holder may be used.

(C) The probe and filter heating system may be heated at  $248 \pm 25$  degrees Fahrenheit.

(D) All filters shall be cooled and stored in a dessicator previous to weighing. Exposure to the ambient air shall be minimized to the extent that it is practical. This same procedure shall be used if any subsequent weighing is necessary.

(iv) The sampling time shall correspond to a minimum of 5 coke oven pushes per battery.

(h) Coke oven coal preheater scrubber outlet test procedures. Outlet emission tests for any scrubber emission control equipment controlling emissions from a coke oven coal preheater shall be conducted as follows:

(i) The testing program shall consist of 3 valid sampling runs.

(ii) Based on design and previous data, saturated conditions shall be assumed. The moisture content shall be calculated as per R 336.2004(1)(d) based on stack conditions during the preliminary and sampling traverses.

(iii) The stack sampling equipment and procedures described in method 5C shall be used in performing a particulate emission test with the following variations:

(A) A stainless steel probe liner after the nozzle may be used.

(B) Glass or glass-lined stainless steel tubing and a glass cyclone between the probe and filter holder may be used.

(C) The probe and filter heating system may be heated at  $248 \pm 25$  degrees Fahrenheit.

(i) Electric arc furnace stack test procedures. Emissions from any electric arc furnace stack shall be tested as follows:

(i) The testing program shall consist of 3 valid sampling runs. A sampling run is the time beginning when the roof is placed on the furnace, after the first charge, and ending with the time when the roof is removed, just prior to tapping.

(ii) The particulate emission rate shall be determined as specified in reference test method 5C, with the following exceptions:

(A) A stainless steel probe liner after the nozzle may be used.

(B) Glass or glass-lined stainless steel tubing and a glass cyclone between the probe and filter holder may be used.

(C) The probe and filter heating system may be heated to  $248 \pm 25$  degrees Fahrenheit.

(D) The emission rate for any furnace controlled by a positive pressure baghouse, or by a baghouse exhausted by more than 5 stacks, shall be determined as specified in R 336.2014.

(j) Sinter plant gravel bed filter test procedures. Emissions from any gravel bed filter emission control equipment controlling emissions from a sinter plant shall be tested as follows:

(i) The testing program shall consist of 3 valid sampling runs.

(ii) The stack sampling equipment and procedures described in method 5C shall be used in performing a particulate emission test with the following variations:

(A) A stainless steel probe liner after the nozzle may be used.

(B) Glass or glass-lined stainless steel tubing and a glass cyclone between the probe and filter holder may be used.

(C) The probe and filter heating system may be heated at  $248 \pm 25$  degrees Fahrenheit.

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(k) Miscellaneous. During each stack test performed, the owner or operator shall provide a representative of the department access to production data and other parameters that are necessary for determining compliance.

(l) Sample volume. The minimum volume per sample shall be 50 cubic feet of dry gas corrected to standard conditions, 70 degrees Fahrenheit, 29.92 inches of mercury, unless specified otherwise in the provisions of this rule.

(m) Opacity tests. During each stack test performed, simultaneous visible emission evaluations shall be conducted according to the reference test method specified in R 336.1303 for the process being tested.

(n) Operating conditions. During each run of a stack test, the facility to be tested shall be operated at a batch or other similar production level which is representative of the actual level during the preceding 3 months before the first day of the test, unless the department approves or specifies alternate acceptable operating conditions.

(o) Compliance. Compliance with any mass emission standard shall be determined by averaging 3 test runs using all test procedures specified for the tested process in this rule.

History: 1985 MR 2, Eff. Feb. 22, 1985; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2014 Reference test method 5E.**

Rule 1014. Reference method 5E, determination of particulate matter emissions from positive pressure fabric filters, reads as follows:

(a) The principle, applicability, and performance test criteria are as follows:

(i) Principle. Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature at or above the exhaust gas temperature up to a nominal  $248 \pm 25$  degrees Fahrenheit. The particulate mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after the removal of uncombined water.

(ii) Applicability. This method is applicable for the determination of particulate emissions from the stationary sources as identified in table 31 of R 336.1331. The method is also applicable when specifically provided for in the department's rules, orders, a permit to install, or a permit to operate.

(iii) Performance test criteria:

(A) A performance test shall consist of a minimum of 3 separate samples of a specific air contaminant conducted within a 36-hour period, unless otherwise authorized by the department. Each of the 3 separate samples shall be obtained while the source is operating at a similar production level. For the purpose of determining compliance with an applicable emission limit, rule, or permit condition, the arithmetic mean of results of the 3 samples shall apply. If a sample is accidentally lost or conditions occur in which 1 of the 3 samples must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sampling train, extreme meteorological conditions, or other circumstances beyond the owner's or operator's control, compliance may, upon the approval of the department, be determined using the arithmetic mean of the results of 2 samples.

(B) For any source that is subject to an emission limitation calculated to 50% excess air, the multipoint, integrated sampling procedure of R 336.2004(1)(c) shall be used for gas analysis. For all other sources that require a determination of the molecular weight of the exhaust, any optional sampling procedure of R 336.2004(1)(c) may be used. Alternatives or modifications to procedures are subject to the approval of the department.

(C) The minimum volume per sample shall be 30 cubic feet actual gas. Minimum sample time shall be 60 minutes, which may be continuous or a combination of shorter sampling periods for sources that operate in a cyclic manner. Smaller sampling times or sample volumes, when necessitated by process variables or other factors, may be approved by the department.

(D) For any source whose emission control device alters the moisture content of the exhaust gas, a moisture determination shall be performed in a location upstream from the emission control device and in accordance with R 336.2004(1)(d) or an alternative method approved by the department.

(b) The following provisions apply to apparatus:

(i) Sampling train. A schematic of the sampling train used in this method is shown in figure 103. Construction details for many, but not all, of the train components are given in APTD-0581 (subdivision (g)(ii) of this rule). For changes from the APTD-0581 document and for allowable modifications to figure 103, consult with the department.

The operating and maintenance procedures for many, but not all, of the sampling train are described in APTD-0576 (subdivision (g)(iii) of this rule). Since correct usage is important in obtaining valid results, all users shall read APTD-0576 and adopt the applicable operating and maintenance procedures outlined in it, unless otherwise specified in these rules. The sampling train consists of the following components:

(A) Probe nozzle. Stainless steel (316) or glass with sharp, tapered leading edge. The angle of taper shall be less than 30 degrees and the taper shall be on the outside to preserve a constant internal diameter. The probe nozzle shall be of the button-hook design, unless otherwise specified by the department. If made of stainless steel, the nozzle shall be constructed from seamless tubing. Other materials of construction may be used, subject to the approval of the department.

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A range of nozzle sizes suitable for isokinetic sampling shall be available, for example, 0.32 to 1.27 cm (1/8 to 1/2 in.) - or larger if higher volume sampling trains are used - inside diameter (ID) nozzles in increments of 0.16 cm (1/16 in.). Each nozzle shall be calibrated according to the procedures outlined in subdivision (e) of this rule.

(B) Probe liner. Borosilicate or quartz glass tubing with a heating system capable of maintaining a gas temperature at the exit end during sampling of  $120 \pm 14$  degrees Centigrade ( $248 \pm 25$  degrees Fahrenheit), another temperature as specified by the department's rules, or a temperature approved by the department for a particular application. The tester may opt to operate the equipment at a temperature lower than that specified. Since the actual temperature at the outlet of the probe is not usually monitored during sampling, probes constructed according to APTD-0581 which utilize the calibration curves of APTD-0576, or calibrated according to the procedure outlined in APTD-0576, are acceptable.

Either borosilicate or quartz glass probe liners may be used for stack temperatures up to about 480 degrees Centigrade (900 degrees Fahrenheit); quartz liners shall be used for temperatures between 480 and 900 degrees Centigrade (900 and 1,650 degrees Fahrenheit). Both types of liners may be used at higher temperatures than specified for short periods of time, subject to the approval of the department. The softening temperature for borosilicate is 820 degrees Centigrade (1,508 degrees Fahrenheit) and for quartz it is 1,500 degrees Centigrade (2,732 degrees Fahrenheit).

When practical, every effort shall be made to use borosilicate or quartz glass probe liners. Alternatively, metal liners, such as 316 stainless steel, Incoloy 825, or other corrosion-resistant materials made of seamless tubing, may be used, subject to the approval of the department.

(C) Pitot tube. Type S, as described in section 2.1 of method 2, or other device approved by the department. The pitot tube shall be attached to the probe, as shown in figure 103, to allow constant monitoring of the stack gas velocity. The impact (high pressure) opening plane of the pitot tube shall be even with or above the nozzle entry plane (see method 2, figure 2-6b) during sampling. The type S pitot tube assembly shall have a known coefficient, determined as outlined in section 4 of method 2.

(D) Differential pressure gauge. Incline manometer or equivalent devices (2), as described in section 2.2 of method 2. One manometer shall be used for velocity head (p) readings, and the other shall be used for orifice differential pressure readings.

(E) Filter holders. Two separate filter holders in series or 1 filter holder with separate filter supports and seals for 2 filters. One filter holder with 2 filters held in contact with each other is not acceptable. Materials of construction may be stainless steel (316), glass, teflon, or such other material approved by the department.

(F) Filter heating system. Any heating system capable of maintaining a temperature around the filter holder during sampling of  $120 \pm 14$  degrees Centigrade ( $248 \pm 25$  degrees Fahrenheit), another temperature as specified by the department's rules or a permit condition, or a temperature approved by the department for a particular application. Alternatively, the tester may opt to operate the equipment at a temperature lower than that specified. A temperature gauge capable of measuring temperature to within 3 degrees Centigrade (5.4 degrees Fahrenheit) shall be installed so that the temperature around the filter holders can be regulated and monitored during sampling. Heating systems other than the one shown in APTD-0581 may be used.

(G) Condenser. The following system shall be used to determine the stack gas moisture content: Three impingers connected in series with leak-free ground glass fittings or any similar leak-free noncontaminating fittings. All impingers shall be of the Greenburg-Smith design and shall be modified by replacing the tip with a 1.3 cm (1/2 in.) ID glass tube extending to about 1.3 cm (1/2 in.) from the bottom of the flask. Modifications, such as using flexible connections between the impingers or using materials other than glass, are permitted subject to the approval of the department. The first impinger shall contain a known quantity of water (subdivision (d)(i)(C) of this rule), the second shall be empty, and the third shall contain a known weight of silica gel or equivalent desiccant.

Alternatively, any system that cools the sample gas stream and allows measurement of the water condensed and moisture leaving the condenser, each to within 1 ml or 1 g, may be used subject to the approval of the department. In any case, the means for measuring the moisture leaving the condenser shall be by passing the sample gas stream through a tared silica gel, or equivalent desiccant, trap with exit gases kept below 20 degrees Centigrade (68 degrees Fahrenheit) and determining the weight gain.

If a determination of the particulate matter collected in the impingers is required by the department's rules, a permit to install, or a permit to operate, the impinger system described in this subdivision shall be used, without modification. Contact the department as to the sample recovery and analysis of the impinger contents.

(H) Metering system. Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 3 degrees Centigrade (5.4 degrees Fahrenheit), dry-gas meter capable of measuring volume to within 2%, and related equipment as shown in figure 103. Other metering systems capable of maintaining sampling rates within 10% of isokinetic and capable of determining sample volumes to within 2% may be used, subject to the approval of the department. When the metering system is used in conjunction with a pitot tube, the system shall enable checks of isokinetic rates.

Sampling trains utilizing metering systems designed for higher flow rates than those described in APTD-0581 or APTD-0576 may be used if the specifications of this rule are met.

(I) Barometer. Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in.).

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Hg). In many cases, the barometric reading may be obtained from a nearby national weather service station. When obtained from this source, the station value, which is the absolute barometric pressure, shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 30 m (100 ft.) elevation increase or vice versa for elevation decrease.

(J) Gas density determination equipment. Temperature sensor and pressure gauge, as described in sections 2.3 and 2.4 of method 2, and gas analyzer, if necessary, as described in method 3. The temperature sensor shall, preferably, be permanently attached to the pitot tube or sampling probe in a fixed configuration such that the tip of the sensor extends beyond the leading edge of the probe sheath and does not touch any metal. Alternatively, the sensor may be attached just before use in the field. Note, however, that if the temperature sensor is attached in the field, the sensor shall be placed in an interference-free arrangement with respect to the type S pitot tube openings (see method 2, figure 2.7). As a second alternative, if a difference of not more than 1% in the average velocity measurement is to be introduced, the temperature gauge need not be attached to the probe or pitot tube. This alternative is subject to the approval of the department.

(ii) Sample recovery. The following items are needed:

(A) Probe-liner and probe-nozzle brushes. Nylon bristle brushes with stainless steel wire handles. The probe brush shall have extensions, at least as long as the probe, made of stainless steel, nylon, teflon, or similarly inert material. The brushes shall be properly sized and shaped to brush out the probe liner and nozzle.

(B) Wash bottles--2. Glass wash bottles are recommended; polyethylene wash bottles may be used at the option of the tester. It is recommended that acetone not be stored in polyethylene bottles for longer than a month.

(C) Glass sample storage containers. Chemically resistant, borosilicate glass bottles, for acetone washes, 500 ml or 1000 ml. Screw cap liners shall either be rubber-backed teflon or shall be constructed so as to be leak-free and resistant to chemical attack by acetone. Narrow-mouth glass bottles have been found to be less prone to leakage. Alternatively, polyethylene bottles may be used.

(D) Filter containers. Glass, polyethylene, or aluminum tube containers, unless otherwise specified by the department.

(E) Graduated cylinder or balance. To measure condensed water to within 1 ml or 1 g. Graduated cylinders shall have subdivisions of not more than 2 ml. Most laboratory balances are capable of weighing to the nearest 0.5 g or less. Any of these balances are suitable for use here and in paragraph (iii)(D) of this subdivision.

(F) Plastic storage containers. Airtight containers to store silica gel.

(G) Funnel and rubber policeman. To aid in the transfer of silica gel to container; not necessary if silica gel is weighed in the field.

(H) Funnel. Glass or polyethylene, to aid in sample recovery.

(iii) Analysis. The following equipment is needed for analysis:

(A) Glass weighing dishes.

(B) Desiccator.

(C) Analytical balance. To measure to within 0.1 mg.

(D) Balance. To measure to within 0.5 mg.

(E) Beakers. 250 ml.

(F) Hygrometer. To measure the relative humidity of the laboratory environment.

(G) Temperature gauge. To measure the temperature of the laboratory environment.

(c) The following provisions apply to reagents:

(i) Sampling. The reagents used in sampling are as follows:

(A) Filters. Two outstack filters may be any combination of alundum ceramic thimble filters, type RA-98 or glass fiber filters, type A without organic binder. The size of such filters shall allow proper sampling rates to maintain isokinetics using the nozzle sizes specified in subdivision (b)(i)(A) of this rule.

Alternatively, other types of filters may be used, subject to the approval of the department.

(B) Silica gel. Indicating type, 6 to 16 mesh. If previously used, dry at 175 degrees Centigrade (350 degrees Fahrenheit) for 2 hours. New silica gel may be used as received. Alternatively, other types of desiccants, the equivalent or better of silica gel, may be used, subject to the approval of the department.

(C) Water. When analysis of the material caught in the impingers is required, distilled water shall be used. Run blanks before field use to eliminate a high blank on test samples.

(D) Crushed ice.

(E) Stopcock grease. Acetone-insoluble, heat-stable silicone grease. This is not necessary if screw-on connectors with teflon sleeves, or equivalent, are used. Alternatively, other types of stopcock grease may be used, subject to the approval of the department.

(ii) Sample recovery. Washing solvent. Either acetone or distilled water may be used for sample recovery. If acetone is used for washing solvent, then reagent grade, less than 0.001% residue, in glass bottles is required. Acetone from metal containers generally has a high residue blank and shall not be used. Suppliers sometimes transfer acetone to glass bottles from metal



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containers; thus, acetone blanks shall be run before field use, and only acetone with low blank values, less than 0.001%, shall be used. In no case shall a blank value of more than 0.001% of the weight of acetone used be subtracted from the sample weight.

If distilled water is used for washing solvent, use distilled water with less than 0.001% residue. Run blanks before field use to eliminate a high blank on test samples.

(iii) Analysis. Two reagents are required for the analysis:

(A) Solvent. Same as paragraph (ii) of this subdivision for quantitative transfer.

(B) Desiccant. Anhydrous calcium sulfate, indicating type. Alternatively, other types of desiccants may be used, subject to the approval of the department.

(d) The following provisions apply to procedures:

(i) Determination of single measurement sites. The measurement site for a positive pressure fabric filter with an exhaust stack meeting method 1 criteria shall be in accordance with section 2.1 of method 1. The measurement site for positive pressure fabric filters with short stacks or physical configuration not amenable to the requirements of method 1 shall be determined from the following alternatives, or as approved by the department:

(A) Short stacks not meeting method 1 criteria: Short stacks may be extended in accordance with the procedures set forth in method 1 or by the use of flow straightening vanes. The flow straightening vanes shall be of the egg crate design (see figure 109). The measurement site, when using straightening vanes, shall be at a distance not less than 2 times the average equivalent diameter of the vane opening and not less than 1/2 of the overall stack diameter upstream of the stack outlet.

(B) Roof monitor or monovent exhaust outlets: For positive pressure fabric filters equipped with peaked roof monitors, ridge vents, or other types of monovalents, use a measurement site at the base of the monovalent. Examples of such locations are shown in figure 108. The measurement site shall be upstream of any exhaust point.

(C) Measurement site in fabric filter compartment housing. Sample immediately downstream of the filter bags directly as shown in the examples in figure 108. Depending on the housing design, use sampling ports in the housing walls or locate the sampling equipment within the compartment housing.

(ii) Determination of number and location of traverse points. The number and location of traverse points for single exhaust stacks on positive pressure fabric filters meeting method 1 criteria shall be in accordance with section 2.3 of method 1. The number of traverse points for other single measurement sites not meeting method 1 criteria shall not be less than 24. For example, a rectangular measurement site, such as a monovalent, would require the use of a balanced 5-by-5 traverse point matrix. All traverse points shall be sampled for each test run.

(iii) Multiple measurement sites. Sampling from 2 or more stacks or measurement sites may be combined for a test run, if all of the following requirements are met:

(A) All measurement sites up to 12 shall be sampled. For more than 12 measurement sites, conduct sampling on not less than 12 sites or 50% of the sites, whichever is greater. The measurement sites sampled shall be evenly, or nearly evenly, distributed among the available sites, if not all of the sites are to be sampled.

(B) The same number of measurement sites shall be sampled for each test run.

(C) The minimum number of traverse points per test run is 24. An exception to the 24-point minimum would be a test combining the sampling from 2 stacks meeting method 1 criteria for acceptable stack length, and method 1 specifies fewer than 12 points per site.

(D) As long as the 24 traverse points per test run criterion is met, the number of traverse points per measurement site may be reduced to 8.

Alternatively, conduct a test run for each measurement site individually using the criteria in this paragraph and paragraph (ii) of this subdivision for number of traverse points. Each test shall count toward the total of 3 required for a performance test. If more than 3 measurement sites are sampled, the number of traverse points per measurement site may be reduced to 8 if not less than 72 traverse points are sampled for all 3 tests.

(iv) Sampling. The complexity of this method is such that, in order to obtain reliable results, testers shall be trained and experienced with the test procedures. Sampling shall comply with the following provisions:

(A) Pretest preparation. All the components shall be maintained and calibrated according to the applicable procedures described in APTD-0576, unless otherwise specified in this rule.

Weigh several 200 to 300 g portions of silica gel in airtight containers to the nearest 0.5 g. Record the total weight of the silica gel plus container on each container. As an alternative, the silica gel need not be preweighed, but may be weighed directly in its impinger or sampling holder just before train assembly.

Check filters visually against light for irregularities, flaws, pinhole leaks, or cracks. Label filters of the proper size on the back side using numbering machine ink. As an alternative, label the shipping containers (subdivision (b)(ii)(D) of this rule) and keep the filters in these containers at all times, except during sampling and weighing.

Dry the filters in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1 hour in a desiccator containing anhydrous calcium sulfate, and individually weigh and record their weights to the nearest 0.1

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mg. During the weighing, the filters shall not be exposed to the laboratory atmosphere for a period of more than 2 minutes and a relative humidity above 50%. Procedures, other than those specified, that account for relative humidity effects may be used, subject to the approval of the department.

(B) Preliminary determinations. Select the sampling site and the minimum number of sampling points according to method 1 or as specified by the department. Determine the stack pressure, temperature, and the range of velocity heads using method 2; it is recommended that a leak check of the pitot lines (see method 2, section 3.1) be performed. Determine the moisture content using approximation method 4, or its alternatives, for the purpose of making isokinetic sampling rate settings. Determine the stack gas dry molecular weight, as described in method 2, section 3.6; if integrated method 3 sampling is used for molecular weight determination, the integrated bag sample shall be taken simultaneously with, and for the same total length of time as, the particulate sample run.

Select a nozzle size based on the range of velocity heads so that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates. During the run, do not change the nozzle size. Ensure that the proper differential pressure gauge is chosen for the range of velocity heads encountered (see section 2.2 of method 2).

Select a suitable probe liner and probe length so that all traverse points can be sampled. For large stacks, consider sampling from opposite sides of the stack to reduce the length of probes.

Select a total sampling time greater than or equal to the minimum total sampling time specified in the test procedures for the specific industry so that the sampling time per point is not less than 5 minutes, unless approved by the department, or some greater time interval as specified by the department, and so that the sample volume taken, corrected to standard conditions, exceeds the required minimum total gas sample volume. The latter is based on an approximate average sampling rate.

It is recommended that the number of minutes sampled at each point be an integer or an integer plus 1/2 minute to avoid timekeeping errors.

In some circumstances, such as in batch cycles, it may be necessary to sample for shorter times at the traverse points and to obtain smaller gas sample volumes. In these cases, the department's approval shall first be obtained.

(C) Preparation of collection train. During preparation and assembly of the sampling train, keep all openings where contamination can occur covered until just before assembly or until sampling is about to begin.

Place 100 ml of water in the first impinger, leave the second impinger empty, and transfer approximately 200 to 300 g of preweighed silica gel from its container to the third impinger. More silica gel may be used, but care should be taken to ensure that it is not entrained and carried out from the impinger during sampling. Place the container in a clean place for later use in the sample recovery. Alternatively, the weight of the silica gel plus impinger may be determined to the nearest 0.5 g and recorded.

Using tweezers or clean disposable surgical gloves, place a labeled (identified) and weighed filter in the filter holder. Be sure that the filter is properly centered and the gasket properly placed so as to prevent the sample gas stream from circumventing the filter. Check the filter for tears after assembly is completed.

When glass liners are used, install the selected nozzle using a Viton A O-ring when stack temperatures are less than 260 degrees Centigrade (500 degrees Fahrenheit) and an asbestos string gasket when temperatures are higher. See APTD-0576 for details. Other connecting systems using either 310 stainless steel or teflon ferrules may be used. When metal liners are used, install the nozzle in the same manner as for glass liners or by a leak-free direct mechanical connection. Mark the probe with heat-resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

Set up the train as in figure 103. If necessary, use a very light coat of silicone grease on all ground glass joints. Grease only the outer portion (see APTD-0576) to avoid the possibility of contamination by the silicone grease.

Place crushed ice around the impingers.

(D) Leak check procedures:

(1) Pretest leak check. A pretest leak check is strongly recommended, but not required, to prevent invalid sampling and wasted time. If the tester opts to conduct the pretest leak check, the following procedure shall be used:

After the sampling train has been assembled, turn it on and set the filter and probe heating systems at the desired operating temperatures. Allow time for the temperatures to stabilize. If a Viton A O-ring or other leak-free connection is used in assembling the probe nozzle to the probe liner, leak check the train at the sampling site by plugging the nozzle and pulling a 380 mm Hg (15 in. Hg) vacuum. A lower vacuum may be used if it is not exceeded during the test.

If an asbestos string is used, do not connect the probe to the train during the leak check. Instead, leak check the train by first plugging the inlet to the filter holder (cyclone, if applicable) and pulling a 380 mm Hg (15 in. Hg) vacuum. A lower vacuum may be used if it is not exceeded during the test. Then connect the probe to the train and leak check at about 25 mm Hg (1 in. Hg) vacuum; alternatively, the probe may be leak checked with the rest of the sampling train, in 1 step, at 380 mm Hg (15 in. Hg) vacuum. Leakage rates in excess of 4% of the average sampling rate or 0.00057 m<sup>3</sup>/min (0.02 cfm), whichever is less, are unacceptable.

The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump with the bypass valve fully open and the coarse adjust valve completely closed. Partially open the coarse adjust

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valve and slowly close the bypass valve until the desired vacuum is reached. Do not reverse the direction of the bypass valve; this will cause water to back up into the filter holder. If the desired vacuum is exceeded, either leak check at this higher vacuum or end the leak check and start over.

When the leak check is completed, first slowly remove the plug from the inlet to the probe, filter holder, or cyclone, if applicable, and immediately turn off the vacuum pump. This prevents the water in the impingers from being forced backward into the filter holder and prevents silica gel from being entrained backward into the third impinger.

(2) Leak checks during sample run. If, during the sampling run, a component, such as a filter assembly or impinger, change becomes necessary, a leak check shall be conducted immediately before the change is made. The leak check shall be done according to the procedure outlined in paragraph (iv)(D)(1) of this subdivision, except that it shall be done at a vacuum equal to or greater than the maximum value recorded up to that point in the test. If the leakage rate is found to be not more than 0.00057 m<sup>3</sup>/min (0.02 cfm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered; if, however, a higher leakage rate is obtained, the tester shall either record the leakage rate and plan to correct the sample volume, as shown in subdivision (f)(iii) of this rule, or shall void the sampling run.

Immediately after component changes, leak checks are optional; if such leak checks are done, the procedure outlined in paragraph (iv)(D)(1) of this subdivision shall be used.

(3) Post-test leak check. A leak check is mandatory at the conclusion of each sampling run. The leak check shall be done in accordance with the procedures outlined in paragraph (iv)(D)(1) of this subdivision, except that it shall be conducted at a vacuum equal to or greater than the maximum value reached during the sampling run. If the leakage rate is found to be not more than 0.00057 m<sup>3</sup>/min (0.02 cfm) or 4% of the average sampling rate, whichever is less, the results are acceptable and no correction need be applied to the total volume of dry gas metered. If, however, a higher leakage rate is obtained, the tester shall either record the leakage rate and correct the sample volume, as shown in subdivision (f)(iii) of this rule, or shall void the sampling run.

(E) Particulate train operation. During the sampling run, maintain an isokinetic sampling rate that is within 10% of true isokinetic, unless otherwise specified by the department.

For each run, record the data required on a data sheet such as the one shown in figure 104. Be sure to record the initial dry-gas meter reading. Record the dry-gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates are made, before and after each leak check, and when sampling is halted. Take other readings required by figure 104 at least once at each sample point during each time increment, and take additional readings when significant changes, 20% variation in velocity head readings, necessitate additional adjustments in flow rate. Level and zero the manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.

Clean the portholes before the test run to minimize the chance of sampling deposited material. To begin sampling, remove the nozzle cap and verify that the pitot tube and probe are properly positioned. Position the nozzle at the first traverse point with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs that aid in the rapid adjustment of the isokinetic sampling rate without excessive computations are available. These nomographs are designed for use when the type S pitot tube coefficient is  $0.85 \pm 0.02$  and the stack gas equivalent density (dry molecular weight) is equal to  $29 \pm 4$ . APTD-0576 details the procedure for using the nomographs. If  $C_p$  and  $M_d$  are outside the above stated ranges, do not use the nomographs unless appropriate steps (see subdivision (g)(iv) of this rule) are taken to compensate for the deviations.

When the stack is under significant negative pressure (height of impinger stem), take care to pull low flow when inserting the probe into the stack to prevent water from backing into the sample tubing and to avoid pulsation through the filter and possible loss of materials.

When the probe is in position, block off the openings around the probe and porthole to prevent unrepresentative dilution of the gas stream.

Traverse the stack cross section, as required by method 1 or as specified by the department, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe through the portholes; this minimizes the chance of extracting deposited material.

During the test run, add more ice and, if necessary, salt to maintain a temperature of less than 20 degrees Centigrade (68 degrees Fahrenheit) at the condenser/silica gel outlet. Also, periodically check the level and zero of the manometer.

If the pressure drop across the filter becomes too high and makes isokinetic sampling difficult to maintain, the filter may be replaced in the midst of a sample run. It is recommended that another complete filter assembly be used rather than attempting to change the filter itself. Before a new filter assembly is installed, conduct a leak check (see paragraph (iv)(D)(2) of this subdivision). The total particulate weight shall include the summation of all filter assembly catches.

A single train shall be used for the entire sample run, except in cases where simultaneous sampling is required in 2 or more separate ducts, at 2 or more different locations within the same duct, or where equipment failure necessitates a change of

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trains. In all other situations, the use of 2 or more trains shall be subject to the approval of the department.

Note that when 2 or more trains are used, separate analyses of the front-half catches from the individual trains may be combined, as may the impinger catches, and 1 analysis of the front-half catch and 1 analysis of impinger catch may be performed. Consult with the department for details concerning the calculation of results when 2 or more trains are used.

At the end of the sample run, turn off the coarse adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final dry-gas meter reading, and conduct a post-test leak check, as outlined in paragraph (iv)(D)(3) of this subdivision. Also, leak-check the pitot lines as described in method 2, section 3.1; the lines shall pass this leak check to validate the velocity head data.

(F) Calculation of percent isokinetic. Calculate percent isokinetic (see subdivision (f) of this rule) to determine whether the run was valid or whether another test run should be made. If there was difficulty in maintaining isokinetic rates due to source conditions, consult with the department for possible variance on the isokinetic rates.

(v) Sample recovery. Proper cleanup procedure begins as soon as the probe is removed from the stack at the end of the sampling period. Allow the probe to cool.

When the probe can be safely handled, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over it to prevent losing or gaining particulate matter. Do not cap off the probe tip tightly while the sampling train is cooling down as this creates a vacuum in the filter holder and draws water from the impingers into the filter holder.

Before moving the sample train to the cleanup site, remove the probe from the sample train, wipe off the silicone grease, and cap the open outlet of the probe. Be careful not to lose any condensate that might be present. Wipe off the silicone grease from the filter inlet where the probe was fastened and cap it. Remove the umbilical cord from the last impinger and cap the impinger. If a flexible line is used between the first impinger or condenser and the filter holder, disconnect the line at the filter holder and let any condensed water or liquid drain into the impingers or condenser. After wiping off the silicone grease, cap off the filter holder outlet and impinger inlet. Ground-glass stoppers, plastic caps, or serum caps may be used to close these openings.

Transfer the probe and filter-impinger assembly to the cleanup area. This area shall be clean and protected from the wind so that the chances of contaminating or losing the sample are minimized.

Save a portion of the solvent used for cleanup as a blank. Take 200 ml of this solvent directly from the wash bottle being used and place it in a glass sample container labeled "solvent blank."

Inspect the train before and during disassembly and note any abnormal conditions. Treat the samples as follows:

Container Nos. 1, 1A. Carefully remove the filters from the filter holders and place in their identified containers. Use a pair of tweezers or clean disposable surgical gloves, or both, to handle the filters. Carefully transfer to the container any particulate matter or filter fibers, or both, that adhere to the filter holder gasket by using a dry nylon bristle brush or sharp-edged blade, or both. Seal the container.

Container No. 2. Taking care to see that dust on the outside of the probe or other exterior surfaces does not get into the sample, the testor shall quantitatively recover from particulate matter or any condensate from the nozzle, probe fitting, probe liner, and from both filter holders by washing these components with solvent and placing the wash in a glass container.

Perform the solvent rinses as follows:

Carefully remove the probe nozzle and clean the inside surface by rinsing with solvent from a wash bottle and brushing with a nylon bristle brush. Brush until the solvent rinse shows no visible particles and then make a final rinse of the inside surface with solvent.

Brush and rinse the inside parts of the Swagelok fitting with solvent in a similar way until no visible particles remain.

Rinse the probe liner with solvent by tilting and rotating the probe while squirting solvent into its upper end so that all inside surfaces are wetted with acetone. Let the solvent drain from the lower end into the sample container. A glass or polyethylene funnel may be used to aid in transferring liquid washes to the container. Follow the solvent rinse with a probe brush. Hold the probe in an inclined position and squirt solvent into the upper end as the probe brush is being pushed with a twisting action through the probe; hold a sample container underneath the lower end of the probe and catch any solvent and particulate matter that is brushed from the probe. Run the brush through the probe 3 or more times until no visible particulate matter is carried out with the solvent or until none remains in the probe liner on visual inspection. With stainless steel or other metal probes, run the brush through, in the manner set forth in this paragraph, not less than 6 times, since metal probes have small crevices in which particulate matter can be entrapped. Rinse the brush with solvent and quantitatively collect these washings in the sample container. After the brushing, make a final solvent rinse of the probe as described above.

It is recommended that 2 people be used to clean the probe to minimize sample losses. Between sampling runs, keep brushes clean and protected from contamination.

After ensuring that all joints have been wiped clean of silicone grease, clean the inside of both filter holders by rubbing the surfaces with a nylon bristle brush and rinsing with solvent. Rinse each surface 3 times, or more if needed, to remove visible particulate. Make a final rinse of the brush and filter holder.

After all solvent washings and particulate matter have been collected in the sample container, tighten the lid on the sample

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container so that solvent will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether or not leakage occurred during transport. Label the container to clearly identify its contents.

Container No. 3. Note the color of the indicating silica gel to determine if it has been completely spent and make a notation of its condition. Transfer the silica gel from the third impinger to its original container and seal. A funnel may make it easier to pour the silica gel without spilling it. A rubber policeman may be used as an aid in removing the silica gel from the impinger. It is not necessary to remove the small amount of dust particles that adhere to the impinger wall and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, follow the procedure for container No. 3 in paragraph (vi) of this subdivision.

Impinger water. Treat the impingers as follows: Make a notation of any color or film in the liquid catch. Measure the liquid that is in the first 2 impingers to within  $\pm 1$  ml by using a graduated cylinder or by weighing it to within  $\pm 1.0$  g by using a balance if none is available. Record the volume or weight of liquid present. This information is required to calculate the moisture content of the effluent gas.

Discard the liquid after measuring and recording the volume or weight, unless analysis of the impinger catch is required (see subdivision (b)(i)(G) of this rule).

If a different type of condenser is used, measure the amount of moisture condensed either volumetrically or gravimetrically.

When possible, containers shall be shipped in a manner that keeps them upright at all times.

(vi) Analysis. Record the data required on a sheet such as the one shown in figure 106. Handle each sample container as follows:

Container Nos. 1, 1A. Analyze and report each filter separately. Transfer the filter and any loose particulate from the sample container to a tared-glass weighing dish. Dry the filter in an oven at 105 degrees Centigrade (220 degrees Fahrenheit) for a minimum of 2 hours, cool for at least 1 hour in a desiccator containing anhydrous calcium sulfate, and weigh and record its weight to the nearest 0.1 mg. During the weighing, the filter shall not be exposed to the laboratory atmosphere for a period of more than 2 minutes or a relative humidity above 50%. Procedures, other than those specified, that account for relative humidity effects may be used, subject to the approval of the department. The method used for the drying and weighing of filters shall be consistent before and after the test.

Container No. 2. Note the level of liquid in the container and confirm on the analysis sheet whether or not leakage occurred during transport. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the department, to correct the final results.

Measure the liquid in this container either volumetrically to  $\pm 1$  ml or gravimetrically to  $\pm 1.0$  g. Transfer the contents to a tared 250-ml beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

Container No. 3. Weigh the spent silica gel, or silica gel plus impinger, to the nearest 0.5 g using a balance. This step may be conducted in the field.

"Solvent blank" container. Measure solvent in this container either volumetrically or gravimetrically. Transfer the contents to a tared 250-ml beaker and evaporate to dryness either at ambient temperature and pressure for acetone or at 95 degrees Centigrade (203 degrees Fahrenheit) in an oven for distilled water. Then subject the sample to 250 degrees Centigrade (482 degrees Fahrenheit) in an oven for 2 to 3 hours. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

If acetone is used, the contents of container No. 2, as well as the acetone blank container, may be evaporated at temperatures higher than ambient. If evaporation is done at an elevated temperature, the temperature shall be closely supervised, and the contents of the beaker shall be swirled occasionally to maintain an even temperature. Use extreme care, as acetone is highly flammable and has a low flash point.

(e) Calibration. Maintain a laboratory log of all calibrations. The following provisions apply to calibrations:

(i) Probe nozzle. Probe nozzles shall be calibrated before their initial use in the field. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in.). Make 3 separate measurements using different diameters each time and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in.). When nozzles become nicked, dented, or corroded, they shall be reshaped, sharpened, and recalibrated before use. Each nozzle shall be permanently and uniquely identified.

(ii) Pitot tube. The type S pitot tube assembly shall be calibrated according to the procedure outlined in section 4 of method 2.

(iii) Metering system. Before its initial use in the field, the metering system shall be calibrated according to the procedure outlined in APTD-0576. Instead of physically adjusting the dry-gas meter dial readings to correspond to the wet-test meter readings, calibration factors may be used to mathematically correct the gas meter dial readings to the proper values. Before calibrating the metering system, it is suggested that a leak check be conducted. For metering systems having diaphragm or rotary pumps, the normal leak check procedure will not detect leakages within the pump. For these cases, the following leak

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check procedure is suggested: Make a 10-minute calibration run at 0.00057 m<sup>3</sup>/min (0.02 cfm); at the end of the run, take the difference of the measured wet-test meter and dry-gas meter volumes; divide the difference by 10 to get the leak rate. The leak rate shall not exceed 0.00057 m<sup>3</sup>/min (0.02 cfm).

After each field use, the calibration of the metering system shall be checked by performing 3 calibration runs at a single, intermediate orifice setting, based on the previous field test, with the vacuum set at the maximum value reached during the test series. To adjust the vacuum, insert a valve between the wet-test meter and the inlet of the metering system. Calculate the average value of the calibration factor. If the calibration has changed by more than 5%, recalibrate the meter over the full range of orifice settings, as outlined in APTD-0576.

Alternatively, a spirometer may be substituted for a wet-test meter in the above mentioned calibration procedures.

Alternative procedures, such as using the orifice meter coefficients, may be used, subject to the approval of the department.

If the dry-gas meter coefficient values obtained before and after a test series differ by more than 5%, the test series shall be performed using whichever meter coefficient value, before or after, gives the lower value of total sample volume.

(iv) Probe heater calibration. The probe heating system shall be calibrated before its initial use in the field according to the procedures outlined in APTD-0576. Probes constructed according to APTD-0581 need not be calibrated if the calibration curves in APTD-0576 are used.

(v) Temperature gauges. Use the procedure in section 4.3 of method 2 to calibrate instack temperature gauges. Dial thermometers, such as those used for the dry-gas meter and condenser outlet, shall be calibrated against mercury-in-glass thermometers.

(vi) Leak check of metering system shown in figure 103. That portion of the sampling train from the pump to the orifice meter shall be leak checked before to initial use and after each shipment. Leakage after the pump will result in less volume being recorded than is actually sampled. The following procedure is suggested (see figure 107): Close the main valve on the meter box. Insert a 1-hole rubber stopper with rubber tubing attached into the orifice exhaust pipe. Disconnect and vent the low side of the orifice manometer. Close off the low side orifice tap. Pressurize the system to 13 to 18 cm (5 to 7 in.) water column by blowing into the rubber tubing. Pinch off the tubing and observe the manometer for 1 minute. A loss of pressure on the manometer indicates a leak in the meter box; leaks, if present, shall be corrected.

(vii) Barometer. Calibrate against a mercury barometer.

(f) Calculations. When carrying out calculations, retain at least 1 extra decimal figure beyond that of the acquired data. Round off figures after the final calculation. Other forms of the equations may be used if they give equivalent results. The following provisions apply to calculations:

(i) Nomenclature:

$A_n$  = Cross-sectional area of nozzle, m<sup>2</sup> (ft.<sup>2</sup>).

$A$  = Cross-sectional area of stack or flue at the point of sampling, ft.<sup>2</sup>.

$B_{ws}$  = Water vapor in the gas stream, proportion by volume, expressed as a fraction.

$B_{wi}$  = Percent water vapor in gas entering source particulate control device determined by method 4.

$B_{wo}$  = Percent water vapor in gas exiting source particulate control device.

$C_a$  = Wash blank residue concentration, mg/g.

$C_s$  = Concentration of particulate matter in stack gas, pounds per 1000 pounds of actual stack gas.

$C_{sD}$  = Concentration of particulate matter in stack gas, moisture excluded, pounds per 1000 pounds of dry stack gas.

$C_{s50}$  = Concentration of particulate matter corrected to 50% excess air, pounds per 1000 pounds of stack gas.

$C_{s50D}$  = Concentration of particulate matter corrected to 50% excess air, excluding any water addition from a collector, pounds per 1000 pounds of stack gas.

$E$  = Mass emission rate of particulate, lb/hr.

$F_{50}$  = Concentration conversion factor to 50% excess air with no moisture alterations in exhaust.

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$F_{50D}$  = Concentration conversion factor to 50% excess air, excluding any moisture added to exhaust gas by pollution collection system.

$F_D$  = Concentration conversion factor to dry basis, excluding any water in the stack gas.

$I$  = Percent of isokinetic sampling.

$L_a$  = Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to 0.00057 m<sup>3</sup>/min (0.02 cfm) or 4% of the average sampling rate, whichever is less.

$L_i$  = Individual leakage rate observed during the leak check conducted prior to the "ith" component change ( $i = 1, 2, 3 \dots n$ ), m<sup>3</sup>/min (cfm).

$L_p$  = Leakage rate observed during the post-test leak check, m<sup>3</sup>/min (cfm).

$M_d$  = Molecular weight of dry stack gas, g/g mole (lb/lb-mole), calculated by method 3, equation 3-2, using data from integrated method 3.

$m_n$  = Total amount of particulate matter collected, mg.

$M_w$  = Molecular weight of water, 18.0 g/g-mole (18.0 lb/lb-mole).

$m_a$  = Mass of residue of solvent after evaporation, mg.

$m_g$  = Total weight of gas samples through nozzle, lb.

$P_{bar}$  = Barometric pressure at the sampling site, mm Hg (in. Hg).

$P_s$  = Absolute stack gas pressure.

$P_{std}$  = Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

$R$  = Ideal gas constant, 0.06236 mm Hg-m<sup>3</sup>/°K-g-mole (21.85 in. Hg-ft.<sup>3</sup>/°R-lb-mole).

$T_m$  = Absolute average dry-gas meter temperature (see figure 104), °K (°R).

$T_s$  = Absolute average stack gas temperature (see figure 104), °K (°R).

$T_{std}$  = Standard absolute temperature, 294.1 °K (530°R).

$V_a$  = Volume of solvent blank, ml.

$V_{aw}$  = Volume of solvent used in wash, ml.

$V_{lc}$  = Total volume of liquid collected in impingers and silica gel (see figure 106), ml.

$V_m$  = Volume of gas sample as measured by the dry-gas meter, dcm (dcf).

$V_{m(std)}$  = Volume of gas sample measured by the dry-gas meter, corrected to standard conditions, dscm (dscf).

$V_{w(std)}$  = Volume of water vapor in the gas sample, corrected to standard conditions, scm (scf).

$V_s$  = Stack gas velocity, calculated by method 2, equation 2-9, using data obtained from method 5, m/sec (ft./sec).

$W_a$  = Weight of residue in solvent wash, mg.

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Y = Dry-gas meter calibration factor.

$\Delta H$  = Average pressure differential across the orifice meter (see figure 104), mm H<sub>2</sub>O (in. H<sub>2</sub>O).

%O<sub>2</sub> = Percent oxygen in stack gas by volume (dry basis).

%N<sub>2</sub> = Percent nitrogen in stack gas by volume (dry basis).

$p_a$  = Density of solvent, mg/ml.

$p_{s(std)}$  = Density of all sampled gas at standard conditions, lb/ft.<sup>3</sup>.

$p_w$  = Density of water, 0.9982 g/ml (0.002201 lb/ml).

$\Theta$  = Total sample time, min.

$\Theta_1$  = Sample time, interval, from the beginning of a run until the first component change, min.

$\Theta_i$  = Sampling time interval, between 2 successive component changes, beginning with the interval between the first and second changes, min.

$\Theta_p$  = Sampling time interval, from the final (n<sup>th</sup>) component change until the end of the sampling run, min.

13.6 = Specific gravity of mercury.

60 = Sec/min.

100 = Conversion to percent.

386.9 = Cubic feet per lb-mole of ideal gas at standard conditions.

453.6 = Conversion of pounds to grams.

3600 = Conversion of hours to sec.

1000 = Conversion of 1000 lb units to lb units.

(ii) Average the dry-gas meter temperature and average the orifice pressure drop. See data sheet (figure 104).

(iii) Dry gas volume. Correct the sample volume measured by the dry-gas meter to standard conditions (21.1 degrees Centigrade, 760 mm Hg or 70 degrees Fahrenheit, 29.92 in. Hg) by using equation 5-1.  
equation 5-1

$$V_{m(std)} = \frac{V_m Y T_{std} (P_{bar} + \Delta H / 13.6)}{T_m P_{std}} = K_1 V_m Y \frac{(P_{bar} + \Delta H / 13.6)}{T_m}$$

Where:

$K_1$  = 0.3869 °K/mm Hg for metric units.

= 17.71 °R/in. Hg for English units.

Equation 5-1 can be used as written. However, if the leakage rate observed during any of the mandatory leak checks (for example, the post-test leak check or leak checks conducted before component changes) exceeds  $L_a$ , equation 5-1 shall be modified as follows:

(A) Case I. No component changes made during sampling run. In this case, replace  $V_m$  in equation 5-1 with the expression:

$$V_m - (L_p - L_a) \theta$$

(B) Case II. One or more component changes made during the sampling run. In this case, replace  $V_m$  in equation 5-1 by the



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expression:

$$V_m - (L_i - L_a)\theta - \sum_{i=2}^n (L_i - L_a)\theta - (L_p - L_a)\theta$$

and substitute only for those leakage rates ( $L_i$  or  $L_p$ ) that exceed  $L_a$ .

(iv) Volume of water vapor.

equation 5-2

$$V_{w(std)} = V_{lc} (p_w / M_w) (R T_{std} / P_{std}) = K_2 V_{lc}$$

Where:

$K_2 = 0.001338 \text{ m}^3/\text{ml}$  for metric units.

$= 0.04733 \text{ ft.}^3/\text{ml}$  for English units.

(v) Moisture content.

equation 5-3

$$B_{ws} = V_{w(std)} / (V_{m(std)} + V_{w(std)})$$

In saturated or water droplet-laden gas streams, 2 calculations of the moisture content of the stack gas shall be made: 1 from the impinger analysis (equation 5-3), and a second from the assumption of saturated conditions. The lower of the 2 values of  $B_{ws}$  shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the note of section 1.2 of method 4. For the purpose of this method, the average stack gas temperature from figure 104 may be used to make the determination, if the accuracy of the in-stack temperature sensor is  $\pm 1$  degree Centigrade (2 degrees Fahrenheit).

(vi) Solvent blank concentration.

equation 5-4

$$C_a = m_a / (V_a P_a)$$

(vii) Solvent wash blank.

equation 5-5

$$W_a = C_a V_{aw} P_a$$

(viii) Total particulate weight. Determine the total particulate catch from the sum of the weights obtained from containers 1, 1A, and 2 less the wash solvent blank (see figure 106).

Refer to subdivision (d)(iv)(E) of this rule to assist in the calculation of results involving 2 or more pairs of filters or 2 or more sampling trains.

(ix) Sampled gas density. Determine the density of the gas sampled from the stack, at standard conditions ( $\text{lb}/\text{ft.}^3$ ).

equation 5-6

$$P_{s(std)} = (M_d (1 - B_{ws}) + M_w B_{ws}) / 386.9$$

(x) Total weight of gas sampled (lbs).

equation 5-7

$$m_g = (V_{m(std)} + V_{w(std)}) P_{s(std)}$$

(xi) Particulate concentration (lbs/1000 lbs).

equation 5-8

$$C_s = m_n / (453.6 m_g)$$

(xii) Excess air and moisture correction factors:

(A) Correction factor to 50% excess air for those sources with or without any particulate collector where no increase in moisture content of the exhaust gas occurs after the process and before the point of sampling.

equation 5-9

$$F_{50} = \frac{M_d + 18 B_{wo} / (100 - B_{wo})}{0.1826 \% N_2 - 2.0592 \% O_2 + M_d + 18 B_{wo} / (100 - B_{wo})}$$

(B) Correction factor to 50% excess air for those sources with a wet collection device (scrubber) that increases the moisture content of the exhaust gas after the process and before the point of sampling.

equation 5-10

$$F_{50D} = \frac{M_d + 18 B_{wo} / (100 - B_{wo})}{0.1826 \% N_2 - 2.0592 \% O_2 + M_d + 18 B_{wi} / (100 - B_{wi})}$$

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(C) Correction factor to convert the actual concentration,  $C_s$ , to dry conditions.  
equation 5-11

$$F_D = \frac{M_d + 18 B_{wo} / (100 - B_{wo})}{M_d}$$

(xiii) Converted particulate concentrations, where applicable under the department's rules or permit.  
equation 5-12

$$C_{s50} = C_s F_{50}$$

equation 5-13

$$C_{s50D} = C_s F_{50D}$$

equation 5-14

$$C_{sD} = C_s F_D$$

(xiv) Mass emission rate (lb/hr).

equation 5-15

$$E = \frac{3600 A V_s C_s P_s T_{std} P_{s(std)}}{1000 T_s P_{std}} = K_3 A V_s C_s P_s P_{s(std)} / T_s$$

Where:

$K_3 = 63.77$  for English units.

(xv) Velocity determinations. Velocity determinations at measurement sites with gas velocities within the range measureable with the type S pitot (for example, velocity head 1.3 mm H<sub>2</sub>O (0.05 in. H<sub>2</sub>O)) shall be conducted according to the procedures in method 2. If the velocity of exhaust gas at the measurement site is below the range measureable with the type S pitot (for example, velocity head 1.3 mm H<sub>2</sub>O) the gas velocity shall be measured at the inlet according to procedures in method 2. Calculate the average gas velocity at the measurement site as follows:

$$V_f = \frac{Q_i T_o}{A_o T_i}$$

Where:

$V_f$  = Average gas velocity of the measurement site(s), m/sec (ft./sec).

$Q_i$  = Inlet gas volume flow rate, m<sup>3</sup>/sec (ft.<sup>3</sup>/sec).

$A_o$  = Measurement site(s) total cross sectional area, m<sup>2</sup>(ft.<sup>2</sup>).

$T_o$  = Temperature of gas at measurement site, °K (°R).

$T_i$  = Temperature of gas at inlet, °K (°R).

Use the average velocity calculated for the measurement site in determining and maintaining isokinetic sampling rates.

All sources of gas leakage, into or out of the fabric filter housing between the inlet measurement site and the outlet measurement site, shall be blocked and made leaktight.

(xvi) Isokinetic variation:

(A) Calculation from raw data.

equation 5-16

$$I = \frac{100 T_s (K_4 V_{lc} + (V_m / T_m)(P_{bar} + \Delta H / 13.6))}{60 \theta V_s P_s A_n}$$

Where:

$K_4 = 0.003458$  mm Hg - m<sup>3</sup>/ml - °K for metric units.

$= 0.002672$  in. Hg - ft.<sup>3</sup>/ml - °R for English units.

(B) Calculation from intermediate values.

equation 5-17

$$I = \frac{T_s V_{m(std)} P_{std} 100}{T_{std} V_s \theta A_n P_s 60(1 - B_{ws})} = K_5 \frac{T_s V_{m(std)}}{P_s V_s A_n \theta (1 - B_{ws})}$$

Where:

$K_5 = 4.307$  for metric units.

$= 0.09409$  for English units.

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(xvii) Acceptable results. If  $90\% \leq I \leq 110\%$ , the results are acceptable. If the results are low in comparison to the standard and I is beyond the acceptable range, or if I is less than 90%, the department may opt to accept the results. Otherwise, reject the results and repeat the test.

(g) Bibliography:

(i) Federal Register, Volume 42, No. 160, Part 60, Chapter 1, Title 40, Appendix A Method 5, August 18, 1977.

(ii) Martin, Robert M. Construction Details of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0581. April, 1971.

(iii) Rom, Jerome J. Maintenance, Calibration, and Operation of Isokinetic Source Sampling Equipment. Environmental Protection Agency. Research Triangle Park, N.C. APTD-0576. March, 1972.

(iv) Shigehara, R. T. "Adjustments in the EPA Nomograph for Different Pitot Tube Coefficients and Dry Molecular Weights." Stack Sampling News 2:4-11. October, 1974.

(v) Guidelines for Source Testing of Particulate. Michigan Department of Natural Resources, Air Quality Division. June 1, 1977.

History: 1985 MR 2, Eff. Feb. 22, 1985; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2021 Figures.**

Rule 1021. Figures 102 to 104 and 106 to 109 read as follows:

FIGURE 102

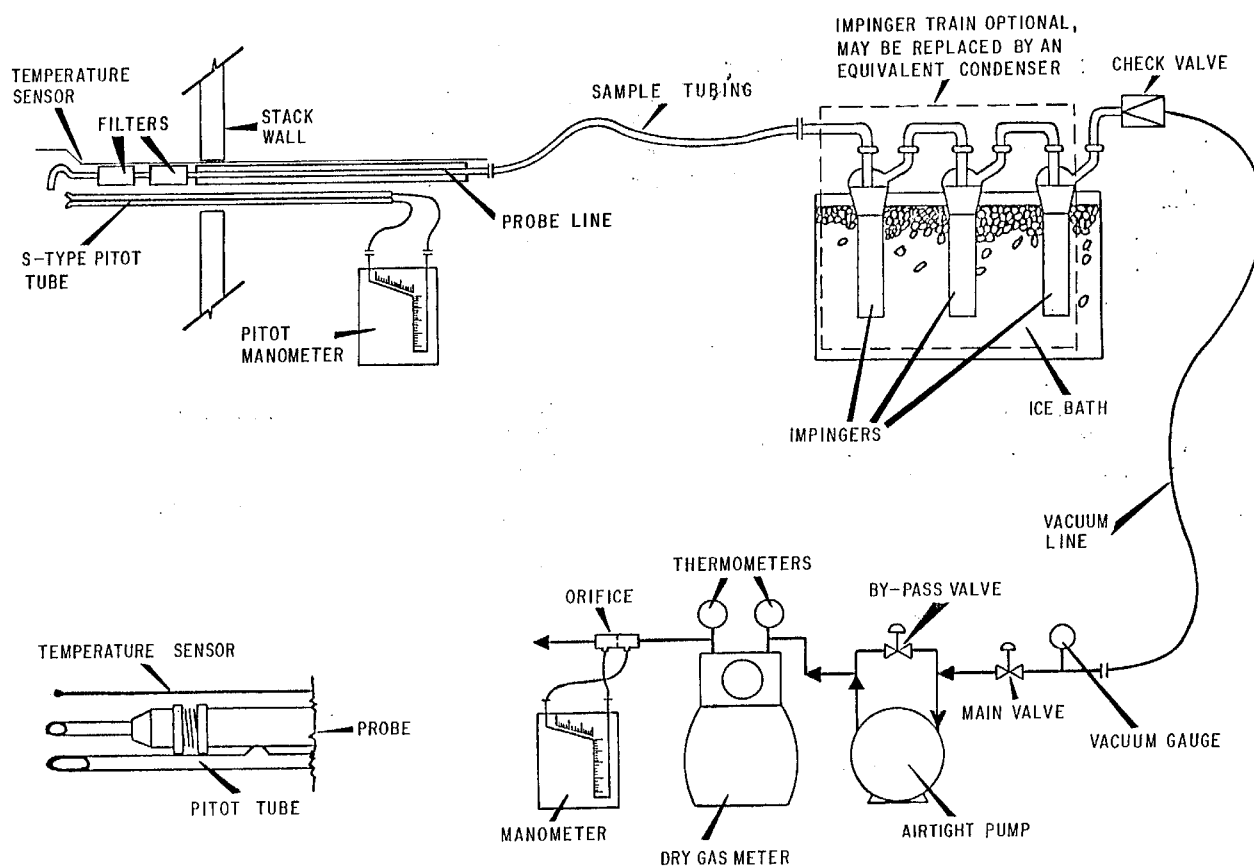
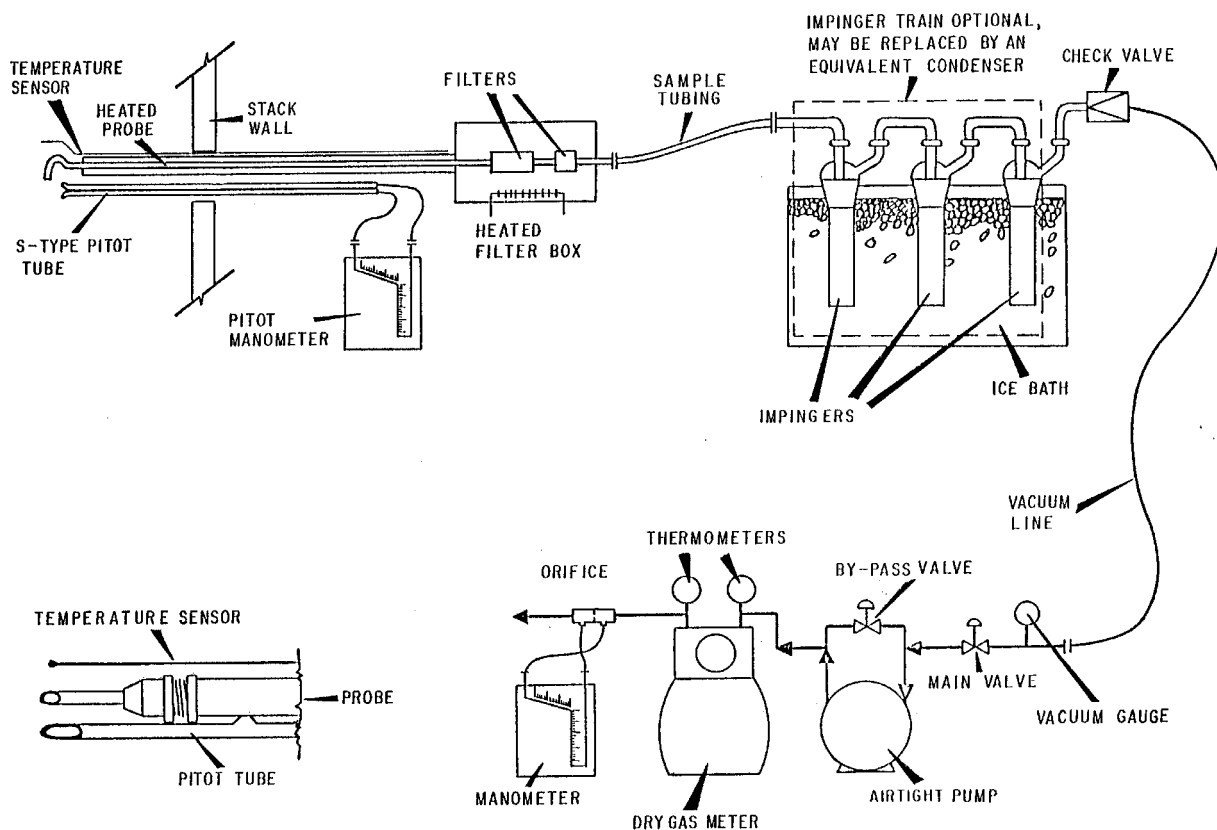


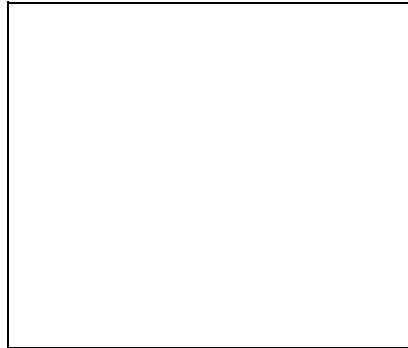
FIGURE 103  
PARTICULATE SAMPLING TRAIN



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FIGURE 104. PARTICLE FIELD DATA.

PLANT \_\_\_\_\_  
 LOCATION \_\_\_\_\_  
 OPERATOR \_\_\_\_\_  
 DATE \_\_\_\_\_  
 SAMPLE BOX NO. \_\_\_\_\_  
  
 METER BOX NO. \_\_\_\_\_  
  
 METER BOX NO. \_\_\_\_\_  
 METER  $\Delta H$  @ \_\_\_\_\_  
 C FACTOR \_\_\_\_\_  
 PITOT TUBE COEFFICIENT,  $C_p$  \_\_\_\_\_



SCHEMATIC OF STACK CROSS  
SECTION

AMBIENT TEMPERATURE \_\_\_\_\_  
 BAROMETRIC PRESSURE \_\_\_\_\_  
 ASSUMED MOISTURE, % \_\_\_\_\_  
 PROBE LENGTH, m (ft) \_\_\_\_\_  
 NOZZLE IDENTIFICATION NO. \_\_\_\_\_  
  
 AVERAGE CALIBRATED NOZZLE DIAMETER, cm (in.) \_\_\_\_\_  
  
 PROBE HEATER SETTING \_\_\_\_\_  
 LEAK RATE, m<sup>3</sup>/min (cfm) \_\_\_\_\_  
 PROBE LINER MATERIAL \_\_\_\_\_

TRAVERSE POINT NUMBER	SAMPLING TIME ( $\theta$ ). min.	STATIC PRESSURE mm Hg (in Hg)	STACK TEMPERAT URE ( $T_s$ ) °C (°F)	VELOCITY HEAD ( $\Delta P_s$ ) mm(in.)H <sub>2</sub> O	GAS SAMPLE VOLUME m <sup>3</sup> (ft <sup>3</sup> )	GAS SAMPLE TEMPERATUR E AT DRY GAS METER		FILTER HOLDER TEMPERATU RE °C(°F)	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °C(°F)
						INLET °C(°F)	OUTL ET °C(°F)		

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TOTAL						Avg.	Avg.		
AVERAGE						Avg.			

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FIGURE 106. ANALYTICAL DATA.

Plant \_\_\_\_\_

Date \_\_\_\_\_

Run No. \_\_\_\_\_

Relative Humidity \_\_\_\_\_

Amount liquid lost during transport \_\_\_\_\_

Solvent blank volume, ml \_\_\_\_\_

Solvent wash volume, ml \_\_\_\_\_

Solvent blank concentration, mg/mg (equation 5-4) \_\_\_\_\_

Solvent wash blank, mg (equation 5-5) \_\_\_\_\_

CONTAINER NUMBER	WEIGHT OF PARTICULATE COLLECTED mg		
	FINAL WEIGHT	TARE WEIGHT	WEIGHT GAIN
1			
1A			
2			
TOTAL			
Less solvent blank			
Weight of particulate matter			

	VOLUME OF LIQUID WATER COLLECTED	
	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g
FINAL		
INITIAL		
LIQUID COLLECTED		
TOTAL VOLUME COLLECTED		g*      ml

CONVERT WEIGHT OF WATER TO VOLUME BY DIVIDING TOTAL WEIGHT INCREASE BY DENSITY OF WATER (lg/ml).

$$\frac{INCREASE, g}{1 g / ml} = VOLUME WATER, ml$$



FIGURE 107  
LEAK CHECK OF METER BOX

BLOW INTO TUBING  
UNTIL MANOMETER  
READS 5 TO 7 INCHES  
WATER COLUMN

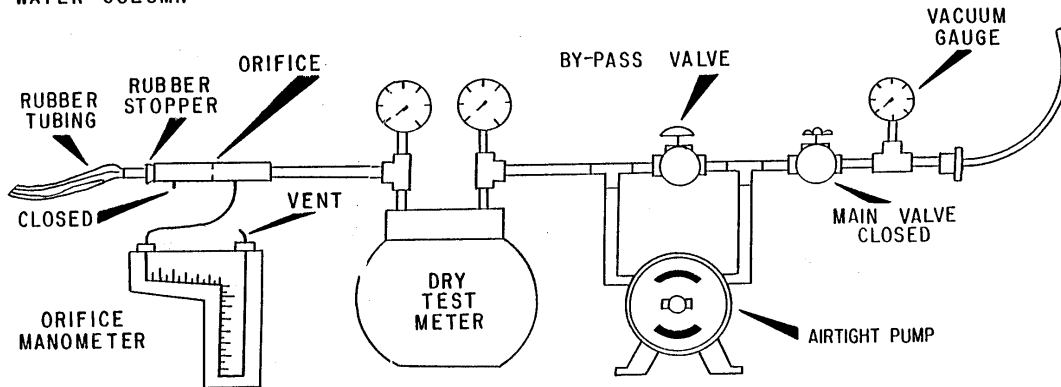


FIGURE 108

Acceptable sampling site locations for: (a) peaked roof; and (b) ridge vent type fabric filters.

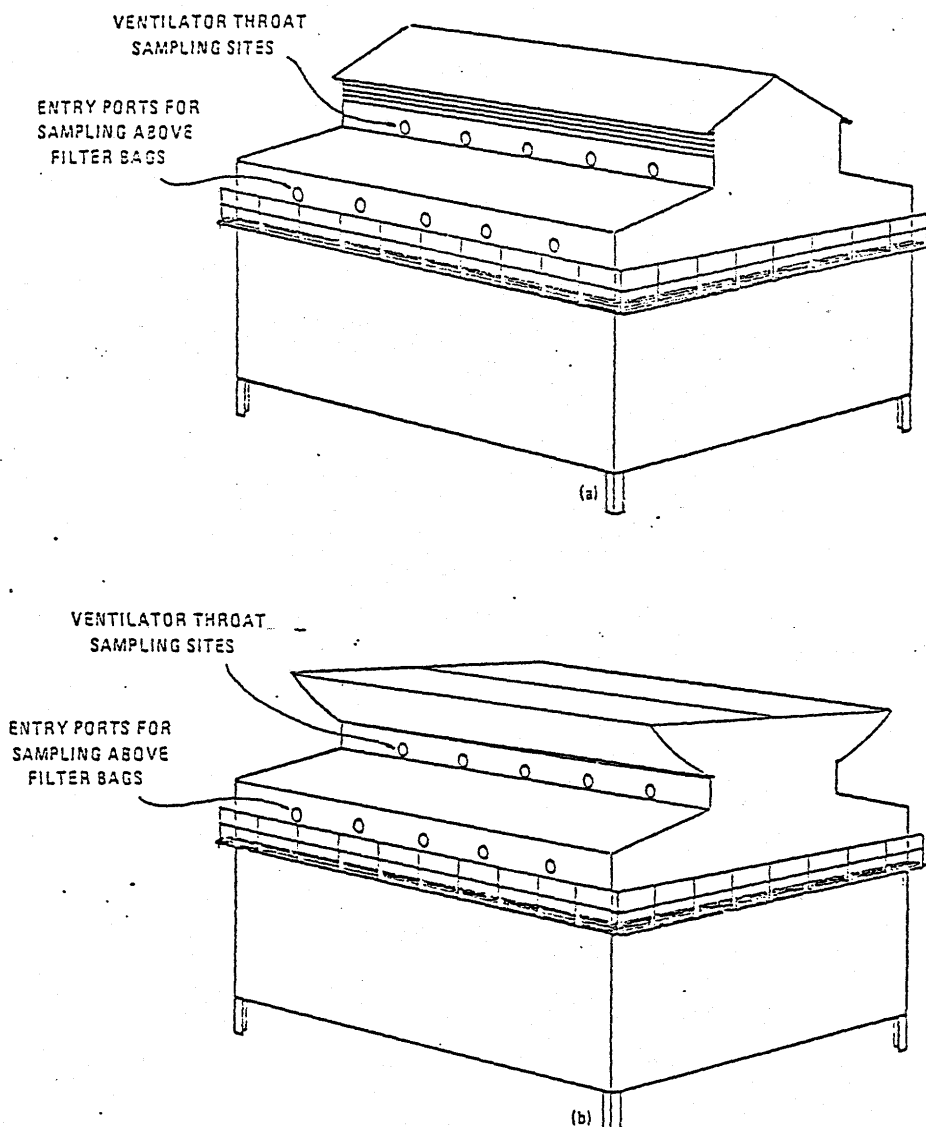
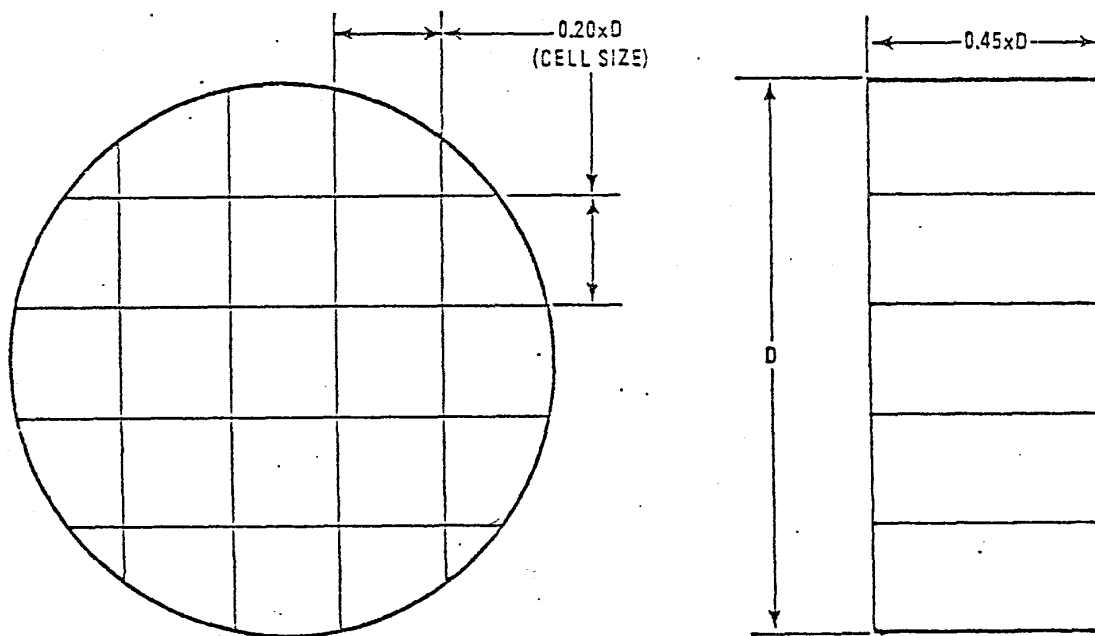


FIGURE 109  
EXAMPLE OF FLOW STRAIGHTENING VANES



NOTE: POSITION STRAIGHTENERS SO THAT CELL SIDES ARE LOCATED APPROX.  $45^\circ$   
FROM TRAVERSE DIA'S.

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History: 1985 MR 2, Eff. Feb. 22, 1985; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2030**

**Source:** 1985 AACCS.

**R 336.2031**

**Source:** 1985 AACCS.

**R 336.2032**

**Source:** 1985 AACCS.

**R 336.2033**

**Source:** 1985 AACCS.

**R 336.2040 Method for determination of volatile organic compound emissions from coating lines and graphic arts lines.**

Rule 1040. (1) The methods described in this rule shall be used for the determination of volatile organic compound emissions from coating lines and graphic arts lines for the purpose of determining compliance, during the specified averaging period, with an emission limit contained in any of the following:

- (a) These rules.
- (b) A permit to install.
- (c) A permit to operate.
- (d) A voluntary agreement.
- (e) A performance contract.
- (f) A stipulation.
- (g) An order of the department.

For emission limits expressed as pounds of volatile organic compounds per gallon of coating, minus water, as applied, the phrase "minus water" shall also include compounds which are used as organic solvents and which are excluded from the definition of volatile organic compound. Concentrations of volatile organic compounds in coatings and inks shall be determined by excluding water and compounds which are used as organic solvents and which are excluded from the definition of volatile organic compound from both the volume of volatiles in the coatings and inks and the volume of the coatings and inks as applied.

(2) Unless otherwise specified in these rules or in a legally enforceable permit, order, or contract as described in subrule (1) of this rule, for a particular coating line or graphic arts line, the applicable method for the determination of volatile organic emissions from coating lines and graphic arts lines is based upon the form of the specified emission limit as follows:

- (a) For coating lines that do not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating, minus water, as applied, use the method described in subrule (12)(a) of this rule.
- (b) For coating lines that have 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating, minus water, as applied, use the method described in subrule (12)(b) of this rule.
- (c) For coating lines that do not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating solids, as applied, use the method described in subrule (12)(c) of this rule.
- (d) For coating lines with 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating solids, as applied, use the method described in subrule (12)(d) of this rule.
- (e) For coating lines that do not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per gallon of applied coating solids, use the method described in subrule (12)(e) of this rule.
- (f) For coating lines that have 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per gallon of applied coating solids, use the method described in subrule (12)(f) of this rule.
- (g) For graphic arts lines that do not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per pound of solids, as applied, use the method described in subrule (12)(g) of this rule.
- (h) For graphic arts lines that have 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per pound of solids, as applied, use the method described in subrule (12)(h) of this rule.

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- (i) For flatwood paneling coating lines that do not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per 1,000 square feet of coated finished product, use the method described in subrule (12)(i) of this rule.
- (j) For flatwood paneling coating lines that have 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per 1,000 square feet of coated finished product, use the method described in subrule (12)(j) of this rule.
- (3) The following nomenclature applies to the equations described in this rule:
- (a)  $a$  = An individual duct through which gases containing volatile organic compounds are ducted to an add-on emissions control device.
- (b)  $B$  = Modified emission limit, converted from pounds of volatile organic compounds per gallon of coating, minus water, as applied, to pounds of volatile organic compounds per gallon of coating solids as applied.
- (c)  $C_{im}$  = Concentration of volatile organic compounds, as measured by the applicable method, in the effluent gas flowing through stack "m" leaving the add-on emissions control device (parts per million by volume).
- (d)  $C_{za}$  = Concentration of volatile organic compounds, as measured by the applicable method, in the influent gas flowing through duct "a" entering the add-on emissions control device (parts per million by volume).
- (e)  $D_{ci}$  = Density of each ink or coating "i" as received from the ink or coating supplier (pounds per gallon of ink or coating).
- (f)  $D_{sj}$  = Density of each volatile organic compound dilution solvent "j" added to the coating (pounds per gallon of solvent, minus water).
- (g)  $DE$  = Volatile organic compound destruction efficiency of the add-on emissions control device.
- (h)  $E$  = Emission limit expressed in pounds of volatile organic compounds per gallon of coating, minus water, as applied.
- (i)  $G_T$  = Total volume of all coatings "z" used during the averaging period (gallons of coating, minus water, as applied).
- (j)  $i$  = An individual coating used during the averaging period that belongs to the coating category for which a compliance determination is being made pursuant to the provisions of this rule. For a graphic arts line, "i" is an individual ink or coating used during the averaging period.
- (k)  $j$  = An individual dilution solvent used during the averaging period that is used in conjunction with a coating "i".
- (l)  $k$  = An individual method of application of coating solids.
- (m)  $L_{ci}$  = Volume of each coating "i" used during the averaging period (gallons of coating, minus water, as applied).
- (n)  $L_{di}$  = Volume of each ink or coating "i" as received from the ink or coating supplier and used during the averaging period (gallons of ink or coating).
- (o)  $L_{ik}$  = Volume of each coating "i" used by each application method "k" during the averaging period (gallons of coating, minus water, as applied).
- (p)  $L_{sj}$  = Volume of each volatile organic compound dilution solvent "j" added to the coating during the averaging period (gallons of solvent, minus water).
- (q)  $M$  = Total weight of volatile organic compounds in all coatings "z" used during the averaging period for a coating line or a graphic arts line (pounds).
- (r)  $m$  = An individual stack through which gases containing volatile organic compounds are ducted to the ambient air from an add-on emissions control device.
- (s)  $M_r$  = Total weight of volatile organic compounds recovered from a recovery-type add-on emissions control device during the averaging period (pounds).
- (t)  $N$  = Fraction, by weight, of the total volatile organic compounds emitted from an operation which is captured and enters the add-on emissions control device (pound per pound).
- (u)  $NT_r$  = Fraction, by weight, of the total volatile organic compounds in all coatings "z" used during the averaging period for a coating line or a graphic arts line which is controlled by an add-on emissions control device "r" (pound per pound).
- (v)  $P$  = For an individual coating "i," pounds of volatile organic compounds per gallon of coating, minus water, as applied.
- (w)  $Ps$  = For an individual coating "i," pounds of volatile organic compounds, minus water, as received from the ink or coating supplier.
- (x)  $P_a$  = As used in subrule (12)(a) of this rule for coating lines that do not have an add-on emissions control device, volume-weighted average pounds of volatile organic compounds per gallon of coating, minus water, as applied, for a single coating category during the averaging period.
- (y)  $P_b$  = As used in subrule (12)(b) of this rule for coating lines that have 1 or more add-on emissions control devices, volume-weighted average pounds of volatile organic compounds per gallon of coating, minus water, as applied, for a single coating category during the averaging period.
- (z)  $P_c$  = As used in subrule (12)(c) of this rule for coating lines that do not have an add-on emissions control device, volume-weighted average pounds of volatile organic compounds per gallon of coating solids, as applied, for a single coating category during the averaging period.
- (aa)  $P_d$  = As used in subrule (12)(d) of this rule for coating lines that have 1 or more add-on emissions control devices,

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volume-weighted average pounds of volatile organic compounds per gallon of coating solids, as applied, for a single coating category during the averaging period.

(bb)  $P_e$  = As used in subrule (12)(e) of this rule for coating lines that do not have an add-on emissions control device, volume-weighted average pounds of volatile organic compounds per gallon of applied coating solids for a single coating category during the averaging period.

(cc)  $P_f$  = As used in subrule (12)(f) of this rule for coating lines that have 1 or more add-on emissions control devices, volume-weighted average pounds of volatile organic compounds per gallon of applied coating solids for a single coating category during the averaging period.

(dd)  $P_g$  = As used in subrule (12)(g) of this rule for graphic arts lines that do not have an add-on emissions control device, average pounds of volatile organic compounds per pound of solids, as applied, for all inks and coatings used during the averaging period.

(ee)  $P_h$  = As used in subrule (12)(h) of this rule for graphic arts lines that have 1 or more add-on emissions control devices, average pounds of volatile organic compounds per pound of solids, as applied, for all inks and coatings used during the averaging period.

(ff)  $P_i$  = As used in subrule (12)(i) of this rule for flatwood paneling coating lines that do not have an add-on emissions control devices, volume-weighted average pounds of volatile organic compounds per 1,000 square feet of coated finished product for a single-coating category during the averaging period.

(gg)  $P_j$  = As used in subrule (12)(j) of this rule for flatwood paneling coating lines that have 1 or more add-on emissions control devices, volume-weighted average pounds of volatile organic compounds per 1,000 square feet of coated finished product for a single-coating category during the averaging period.

(hh)  $Q_{im}$  = Volumetric flow rate of the effluent gas flowing through stack "m" leaving the add-on emissions control device (dry standard cubic feet per hour).

(ii)  $Q_{za}$  = Volumetric flow rate of the influent gas flowing through duct "a" entering the add-on emissions control device (dry standard cubic feet per hour).

(jj)  $Q_{3n}$  = Volumetric flow rate of the effluent gas leaving an uncontrolled stack "n" (dry standard cubic feet per hour).

(kk)  $r$  = An individual add-on emissions control device.

(ll)  $R_r$  = Reduction efficiency of a single add-on emissions control device.

(mm)  $R_t$  = Overall reduction efficiency of all add-on emissions control devices used for a coating line or a graphic arts line.

(nn)  $s$  = The total number of different add-on control devices "r" on a coating line or graphic arts line.

(oo)  $S_q$  = The total surface area of coated finished product for a single-coating category for a flatwood paneling coating line during the averaging period (square feet).

(pp)  $T$  = Overall transfer efficiency for all coatings "i" for a single-coating category on a coating line for the averaging period.

(qq)  $t$  = The total number of stacks "m" leaving an add-on emissions control device "r".

(rr)  $T_i$  = Transfer efficiency for application of coating "i" (%).

(ss)  $u$  = Total number of ducts "a" entering an add-on emissions control device "r".

(tt)  $U_{ci}$  = For representative colors and parts that are tested for transfer efficiency, " $U_{ci}$ " is the volume of each representative color of coating that is applied to each representative part on a coating line during the averaging period.

(uu)  $V$  = For a coating line, the volume of solids in all coatings used "zc" during the averaging period (gallons).

(vv)  $V_{ci}$  = Proportion of solids by volume in each coating "i" (gallon of solids per gallon of coating, minus water, as applied).

(ww)  $W$  = For a graphic arts line, the weight of solids in all inks and coatings used "zg" during the averaging period (pounds).

(xx)  $W_{ci}$  = Proportion of volatiles (volatile organic compounds, water, and exempt compounds) by weight in each ink or coating "i" as received from the ink or coating supplier (pound of volatiles per pound of coating).

(yy)  $x$  = The total number of different application methods "k."

(zz)  $y$  = The total number of different dilution solvents "j."

(aaa)  $z$  = The total number of different coatings "i" used on a coating line or different number of inks and coatings "i" used on a graphic arts line during the averaging period. "z" is used generically in the equations specified in this rule for "zc" when the calculation is made for a coating line and for "zg" when the calculation is made for a graphic arts line.

(bbb)  $zc$  = The total number of different coatings "i" in the same coating category used during the averaging period.

(ccc)  $zg$  = The total number of different inks and coatings "i" used during the averaging period.

(4) The following provisions apply to the calculations for a coating line or graphic arts line made pursuant to the methods described in this rule:

(a) When carrying out calculations, carry not less than 5 significant digits in intermediate calculations. Round off figures after the final calculation, rounding off calculated emission numbers to not less than 2, but not more than 3, significant figures.

(b) The calculations for a coating line shall include all of the coatings which are in the same coating category and which are

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used during the averaging period as specified in the applicable emission limit.

(c) Except as specified in R 336.1624(5)(d), the calculations for a graphic arts line shall include all of the inks and coatings that are used during the averaging period as specified in the applicable emission limit.

(5) The volatile organic compound content of an ink or coating, minus water, as applied, "P," shall be determined using any of the following methods:

(a) The volatile organic compound content of an ink or coating, minus water, as applied, "P," shall be determined according to all of the following provisions:

(i) The volatile organic compound content, minus water, as applied, shall be determined as follows:

(A) For a coating used on a coating line or a coating used on a graphic arts line, the volatile organic compound content, minus water, as applied, shall be determined using federal reference method 24 or federal reference method 24a, as applicable to the coating, as described in R 336.2004, or an alternate method approved by the department.

(B) For an ink that is used on a graphic arts line, the volatile organic compound content, minus water, as applied, shall be determined using federal reference method 24a, as described in R 336.2004.

(ii) The ink or coating sample shall be taken at a point where the sample will be representative of the ink or coating material as applied.

(iii) The sample shall be stored in an enclosed container that is not less than 1 pint in volume.

(iv) By using a procedure that is acceptable to the department, the amount of any compound in the sample that is excluded from the definition of volatile organic compound may be quantified and subtracted from the total amount of volatiles in the sample as determined by federal reference method 24, federal reference method 24a, or an alternate method that is approved by the department. In this case, the volume of any excluded compound in the sample shall also be subtracted from the volume of the ink or coating sample.

(b) Upon written approval by the department, the volatile organic compound content of an ink or coating may be determined from formulation data, which includes batch composition information from the ink or coating manufacturer and the amount of volatile organic compound dilution solvent added to the ink or coating before application. In this case, "P" shall be calculated using the following equation:

$$P = \frac{L_{di} P_s + L_{sj} D_{sj}}{L_{di} + L_{sj}}$$

(c) If a coating or ink is tested by a federal reference method 24 or 24a analysis or by an alternate method approved by the department and the results are different than calculated through formulation data review, then the test method results shall be used for determining compliance with the emission limit.

(6) The weight of volatile organic compounds that are used during the averaging period shall be calculated using the following equation, where "z" is the total number of coatings used:

$$M = \sum_{i=1}^z L_{ci} P$$

(7) The total volume of coating solids that are used during the averaging period shall be calculated using the following equation, where "z" is the total number of coatings used:

$$V = \sum_{i=1}^z L_{ci} V_{ci}$$

(8) The total weight of ink and coating solids that are used during the averaging period shall be calculated using the following equation, where "zg" is the total number of inks and coatings used during the averaging period:

$$W = \sum_{i=1}^{zg} L_{di} D_{ci} (1 - W_{ci})$$

(9) The transfer efficiency shall be determined by the following method, if approved by the department, or by an alternate method approved by the department:

(a) A person who is responsible for the transfer efficiency test shall identify all of the following in a coating operation transfer efficiency test proposal and shall submit the proposal to the department for approval not less than 30 days before the transfer efficiency test:

(i) All processing sequences. A processing sequence is the combination and order of paint booths, flash-off areas, ovens, and application equipment necessary to apply a coating.

(ii) The coating categories used on each processing sequence.

(iii) The representative coating color in each coating category. A representative color shall be determined based upon the volume of coating used in relation to the total volume of coating category coatings used and any other parameters acceptable

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to the department. If it is believed by the department that the transfer efficiency of the various coatings within the same coating category would be different as a result of different coating technologies, such as for metallic topcoat coatings and nonmetallic topcoat coatings, 2 or more representative coating colors may be required by the department to be tested.

(iv) At a minimum, 2 different representative parts coated in each processing sequence. A representative part shall be determined based on the numbers of the part coated in relation to the total number of parts coated, the configuration of the part, and any other parameters acceptable to the department.

(b) For the initial transfer efficiency tests, a person shall test, at a minimum, the representative color or colors in each coating category used on each representative part in each processing sequence. To more closely represent actual process conditions, coatings applied wet-on-wet, such as basecoat and clearcoat, may be tested together. Also, identical colors or clear coats on identical parts in identical processing sequences need not be tested.

(c) A person who is responsible for the transfer efficiency test shall review the operating conditions annually thereafter and demonstrate, to the satisfaction of the department, that significant changes have not occurred in coating technology, the parts coated, or the processing sequence. The most recent test results shall remain valid for 5 years if the person demonstrates that significant change has not occurred. Significant product, processing, material, or application equipment changes shall necessitate retesting of the transfer efficiency of the operations that have been modified. The retesting shall be done as soon as practicable, but not more than 180 days after the start-up and stabilization of the new product, process, material, or application equipment. New transfer efficiency values determined by the retest shall be used retroactively to the start-up of the new product, process, material, or application equipment.

(d) Retests on a coating line may be limited to a representative coating on not less than 2 representative parts in a representative processing sequence, as approved by the department. A representative processing sequence shall be determined based upon coating usage, application equipment, and any other parameters acceptable to the department.

(e) The area in the facility to be used for part weighing shall be selected so as to provide for an area that has relatively constant temperature and minimal air movement.

(f) Except as allowed pursuant to the provisions of subdivision (b) of this subrule, the coating being tested shall be the only coating applied during the transfer efficiency test. If the part is weighed, weight loss from all other materials shall be accounted for in the initial test weight.

(g) A minimum of 10 parts per transfer efficiency test shall be weighed to determine the weight of the solids applied. The average weight gain for the 10 parts tested shall be used as the part weight gain for that transfer efficiency test. All transfer efficiency tests for a processing sequence shall be completed within a 36-hour period.

(h) Each part to be painted shall be identified and preweighed to the nearest 0.05 pound.

(i) The selected paint material at each paint system or paint pot dedicated for the transfer efficiency test shall be isolated.

(j) The amount of material used during the transfer efficiency test shall be determined by either of the following measurement procedures:

(i) The weight measurement procedure as follows:

(A) Weigh the tank of reduced paint, to the nearest 0.01 pound, after all supply and return lines have been filled.

(B) Connect the paint tank to the system and paint the test parts.

(C) Reweigh the tank to the nearest 0.01 pound.

(D) Determine the weight of paint material used by subtracting the final weight of the tank from the initial weight of the tank.

(E) Obtain paint samples for weight solids determination.

(F) Do both the initial and final weighings of the paint tank with the tank pressurized or with the tank not pressurized.

(ii) A volume measurement procedure that is acceptable to the department.

(k) Each painted test part shall be reweighed to the nearest 0.01 pound after paint has cured and cooled.

(l) The weight of the solids in the paint samples shall be determined using ASTM-D2369. ASTM-D2369 is adopted in these rules by reference. A copy of this document may be inspected at the Lansing office of the air quality division of the department of environmental quality. A copy of this document may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, or from the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at a cost as of the time of adoption of these rules of \$25.00.

(m) The coating density in pounds per gallon shall be determined using ASTM-D1475. ASTM-D1475 is adopted in these rules by reference. A copy of this document may be inspected at the Lansing office of the air quality division of the department of environmental quality. A copy of this document may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, or from the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at a cost as of the time of adoption of these rules of \$25.00.

(n) The following equation shall be used to calculate the transfer efficiency for the application of coating "i":



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$$T_i = \frac{\text{Total weight gain of parts tested}}{(\text{total weight of coating used per test}) \times (\text{weight fraction solids})}$$

(o) Where more than 1 part type or coating are tested on a coating line for a single coating category, the overall transfer efficiency "T" for the coating category shall be determined by averaging the individual transfer efficiency values based upon a volume-weighted average of coatings applied during the averaging period for each different color and part type tested. This overall transfer efficiency shall be calculated by using the following equation, where "aa" is the number of coatings tested and "bb" is the number of part types tested:

$$T = \frac{\sum_{i=1}^{aa} \sum_{c=1}^{bb} T_{ci} U_{ci}}{\sum_{i=1}^{aa} \sum_{c=1}^{bb} U_{ci}}$$

(p) Baseline operating parameters of the paint application equipment and the paint booths shall be established for each transfer efficiency test and shall serve as a basis for determining compliance. These parameters shall be included in a transfer efficiency test report and shall include all of the following information:

- (i) Type of spray equipment.
- (ii) Electrostatic voltage.
- (iii) Size and geometry of the part coated.
- (iv) Gun-to-target distance (nonmanual).
- (v) Number of parts per conveyor hook.
- (vi) Air velocity in spray booth (linear feet per minute).
- (vii) Fluid flow settings (by color).
- (viii) Bell revolutions per minute for minibells.
- (ix) Atomizing air pressure.

(10) The capture efficiency "N" shall be determined as follows:

(a) The capture efficiency "N" shall be determined by using the methods specified in 40 C.F.R. §52.741(a)(4)(iii) entitled "Capture Efficiency Test Protocols" and in appendix B entitled "Volatile Organic Material Measurement Techniques for Capture Efficiency," with the following modifications:

(i) The general modifications are as follows:

(a)(4)(iii)(a)(2) If a source owner or operator uses a control device designed to collect and recover voc, for example, carbon adsorber, an explicit measurement of capture efficiency is not necessary if the conditions described in 40 C.F.R. §52.741(a)(4)(iii) are met. The overall emission reduction efficiency of the control system shall be determined each day by directly comparing the input liquid voc to the recovered liquid voc. The procedure for use in this situation is given in 40 C.F.R. §60.433, with the following modifications:

(i) The source owner or operator shall obtain data each day for the solvent usage and solvent recovery and determine the solvent recovery efficiency of the system each day using a 7-day rolling period. The recovery efficiency for each day is computed as the ratio of the total recovered solvent for that day and the prior 6 consecutive operating days to the total solvent usage for the same 7-day period weighted average as given in 40 C.F.R. §60.433. This ratio shall be expressed as a percentage. The ratio shall be computed within 72 hours after each 24-hour period. With the approval of the administrator, a source that believes that the 7-day rolling period is not appropriate may use an alternative multi-day rolling period of not more than 30 days.

#### Appendix B

For procedures G.1, G.2, F.2, F.1, and L, the following modifications:

1.4 Sampling requirements. A capture efficiency test shall consist of not less than 3 sampling runs. Each run shall cover at least 1 complete production cycle, but shall be not less than 3 hours long. The sampling time for each run need not be more than 8 hours, even if the production cycle has not been completed. Alternative sampling times may be used if approved by the administrator.

For procedure L, the following addition:

5.4 Audit procedure. Concurrently, analyze the audit sample and a set of compliance samples in the same manner to evaluate the technique of the analyst and the standards preparation. The same analyst, analytical reagents, and analytical system shall

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be used both for compliance samples and the EPA audit sample. If this condition is met, the auditing of subsequent compliance analyses for the same enforcement agency within 30 days is not required. An audit sample set shall not be used to validate different sets of compliance samples under the jurisdiction of different enforcement agencies, unless prior arrangements are made with both enforcement agencies.

For procedures G.1, G.2, F.2, F.1, and L, the following additions:

5.5 (5.6 for procedure G.2) Audit samples. Audit sample availability. Audit samples will be supplied only to enforcement agencies for compliance tests. The availability of audit samples may be obtained by writing to the following address:

Source Test Audit Coordinator (MD-77B)

Quality Assurance Division

Atmospheric Research and Exposure Assessment Laboratory

U.S. Environmental Protection Agency

Research Triangle Park, NC 27711

The availability of audit samples may also be obtained by calling the source test audit coordinator (STAC) at (919) 541-7834. The request for the audit sample shall be made not less than 30 days before the scheduled compliance sample analysis.

5.6 (5.7 for procedure G.2) Audit results. Calculate the audit sample concentration according to the calculation procedure described in the audit instructions included with the audit sample. Fill in the audit sample concentration and the analyst's name on the audit response form included with the audit instructions. Send 1 copy to the EPA regional office or the appropriate enforcement agency and a second copy to the STAC. The EPA regional office or the appropriate enforcement agency will report the results of the audit to the laboratory being audited. Include this response with the results of the compliance samples in relevant reports to the EPA regional office or the appropriate enforcement agency.

(ii) Owners or operators of coating lines that have multiple stacks may choose to apply the following modifications in addition to the modifications listed in paragraph (i) of this subdivision and to replace the modification to 1.4 listed in paragraph (i) of this subdivision:

(a)(4)(iii)(B) The capture efficiency of a coating line shall be measured using 1 of the 5 protocols given below. Any error margin associated with a test protocol shall not be incorporated into the results of a capture efficiency test. If these techniques are not suitable for a particular process, then the source shall present an alternative capture efficiency protocol and obtain approval for it by the administrator as a sip or fip revision.

(5) Liquid/gas method measuring the captured emission,  $G_w$ , and liquid input,  $L$ . This procedure may only be used when the capture efficiency for a coating line is expected to be less than 50%. The capture efficiency equation to be used for this protocol is:

$$CE = G_w/L$$

Where:

CE = Coating line capture efficiency, decimal fraction.

$G_w$  = Mass of vom captured and delivered to a control device.

$L$  = Mass of liquid vom input to coating line.

Procedure G.1 contained in appendix B of this section is used to obtain  $G_w$ . Procedure L contained in appendix B or the alternate method in R 336.2007 shall be used to determine  $L$ .

#### Appendix B

For procedures G.1, G.2, F.2, F.1, and L, the following modification:

1.4 Sampling requirements. A capture efficiency test shall consist of not less than 3 sampling runs. Each run shall cover at least 1 complete production or processing cycle or shall be at least 1 hour in duration. For automotive surface coating operations, the sampling time per test shall be based on coating a minimum of 3 representative vehicles.

(b) The test protocols and appendix B of 40 C.F.R. §52.741(a)(4)(iii) are adopted in these rules by reference. A copy of these regulations may be inspected at the Lansing office of the air quality division of the department of environmental quality. A copy of these regulations may be obtained from the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at no charge. A copy of 40 C.F.R. part 52 may be obtained from the Superintendent of Documents, Government Printing Office, P.O. Box 371954, Pittsburgh, Pennsylvania 15250-7954, at a cost as of the time

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of adoption of these rules of \$36.00, or on the United States government printing office internet web site at <http://www.access.gpo.gov>.

(c) Where multiple capture systems are used on a coating line or a graphic arts line, the appropriate capture efficiency for each application method shall be determined and the overall capture efficiency for the coating line shall be based upon a mass-weighted average of all volatile organic compounds used on the coating line or the graphic arts line during the averaging period.

(11) The overall reduction efficiency of add-on emissions control devices shall be determined using 1 or more of the following methods, as applicable:

(a) When a destructive-type add-on emissions control device is used, the reduction efficiency for the add-on emissions control device shall be determined by using the following method:

(i) The destruction efficiency of the add-on emissions control device is calculated by using the following equation, where "u" is the total number of ducts entering the control device and "t" is the total number of stacks leaving the control device:

$$DE = \frac{\sum_{a=1}^u Q_{za} C_{za} - \sum_{m=1}^t Q_{im} C_{im}}{\sum_{a=1}^u Q_{za} C_{za}}$$

(ii) Using the destruction efficiency as determined in paragraph (i) of this subdivision, the reduction efficiency of the add-on emissions control device is calculated by using the following equation:

$$R_r = (DE) N$$

(iii) If there is only 1 add-on emissions control device used on a coating line or graphic arts line, use the value calculated for "R<sub>r</sub>" pursuant to paragraph (ii) of this subdivision as the value for R<sub>T</sub> in subsequent calculations.

(iv) The concentration of volatile organic compound emissions entering and exiting the add-on emissions control device shall be determined by using federal reference methods 25 or 25a, federal reference method 18 if approved by the department, the alternate version of federal reference method 25 incorporating the Byron analysis, or an alternate method that is acceptable to the department. Federal reference methods 1, 2, 3, and 4 shall be used for the determination of the volumetric flow rate in the effluent gas. Alternate federal reference method 1A, 2A, 2C, or 2D shall be used where appropriate.

(b) When an add-on emissions control device is used that recovers volatile organic compounds, the reduction efficiency of the device shall be determined by using 1 of the following methods:

(i) A mass balance of the products used and the products recovered, using the following equation:

$$R_r = \frac{M_r}{M}$$

(ii) An alternate method that is acceptable to the department.

(iii) If there is only 1 add-on emissions control device used on a coating line or a graphic arts line, use the value calculated for "R<sub>r</sub>" pursuant to paragraph (i) or (ii) of this subdivision as the value for R<sub>T</sub> in subsequent calculations.

(c) If there is more than 1 add-on emissions control device used on a coating line or a graphic arts line, calculate the overall reduction efficiency by using the following equation:

$$R_T = \sum_{r=1}^s R_r (NT_r)$$

(12) Compliance with the specified emission limit shall be determined using 1 of the following methods, as applicable, based upon the form of the emission limit:

(a) For coating lines that do not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating, minus water, as applied, use either of the following methods:

(i) If only 1 coating is used on the coating line during the averaging time, use the following method:

(A) Determine the volatile organic compound content of the coating, minus water, as applied, "P," by using the method described in subrule (5) of this rule.

(B) If "P" is less than or equal to the specified emission limit, the coating line meets the emission limit.

(ii) If more than 1 coating of the same coating category is used on the coating line during the averaging period, use the following method:

(A) Determine the volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category "P" used during the averaging period by using the method described in subrule (5) of this rule.

(B) Determine the weight of volatile organic compounds used during the averaging period "M" by using the method

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described in subrule (6) of this rule.

(C) Determine the total volume of coatings used on the coating line during the averaging period " $G_T$ " using the following equation:

$$G_T = \sum_{i=1}^z L_{ci}$$

(D) Determine the volume-weighted average weight of volatile organic compounds per gallon, minus water, as applied, by using the following equation:

$$P_a = \frac{M}{G_T}$$

(E) If " $P_a$ " is less than or equal to the specified emission limit, the coating line meets the emission limit.

(b) For coating lines that have 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating, minus water, as applied, use the following method:

(i) Convert the specified emission limit to a modified emission limit " $B$ " expressed in pounds of volatile organic compounds per gallon of coating solids, as applied, by using the following equation:

$$B = \frac{E}{1 - \frac{E}{7.36}}$$

(ii) Determine the volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category " $P$ " used during the averaging period by using the method described in subrule (5) of this rule.

(iii) Determine the weight of volatile organic compounds used during the averaging period " $M$ " by using the method described in subrule (6) of this rule.

(iv) Determine the total volume of coating solids used during the averaging period " $V$ " by using the method described in subrule (7) of this rule.

(v) Determine the overall capture efficiency " $N$ " by using the method described in subrule (10) of this rule.

(vi) Determine the overall reduction efficiency " $R_T$ " by using the method described in subrule (11) of this rule.

(vii) Determine the volume-weighted average weight of volatile organic compounds per gallon of coating solids, as applied, " $P_b$ ," by using the following equation:

$$P_b = \frac{M}{V} (1 - R_T)$$

(viii) If " $P_b$ " is less than or equal to the modified limit " $B$ ," the coating line meets the emission limit.

(c) For coating lines that do not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating solids, as applied, use the following method:

(i) Determine the volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category " $P$ " used during the averaging period by using the method described in subrule (5) of this rule.

(ii) Determine the weight of volatile organic compounds used during the averaging period " $M$ " by using the method described in subrule (6) of this rule.

(iii) Determine the total volume of coating solids used during the averaging period " $V$ " by using the method described in subrule (7) of this rule.

(iv) Determine the volume-weighted average weight of volatile organic compounds per gallon of coating solids, as applied, " $P_c$ ," by using the following equation:

$$P_c = \frac{M}{V}$$

(v) If " $P_c$ " is less than or equal to the specified limit, the coating line meets the emission limit.

(d) For coating lines that have 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating solids, as applied, use the following method:

(i) Determine the volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category " $P$ " used during the averaging period by using the method described in subrule (5) of this rule.

(ii) Determine the weight of volatile organic compounds used during the averaging period " $M$ " by using the method described in subrule (6) of this rule.

(iii) Determine the total volume of coating solids used during the averaging period " $V$ " by using the method described in subrule (7) of this rule.

(iv) Determine the overall capture efficiency " $N$ " by using the method described in subrule (10) of this rule.

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- (v) Determine the overall reduction efficiency " $R_T$ " by using the method described in subrule (11) of this rule.
- (vi) Determine the volume-weighted average weight of volatile organic compounds per gallon of coating solids, as applied, " $P_d$ ," by using the following equation:

$$P_d = \frac{M}{V} (1 - R_T)$$

- (vii) If " $P_d$ " is less than or equal to the specified limit, the coating line meets the emission limit.
- (e) For coating lines that do not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per gallon of applied coating solids, use the following method:
- (i) Determine the volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category "P" used during the averaging period by using the method described in subrule (5) of this rule.
- (ii) Determine the weight of volatile organic compounds used during the averaging period "M" by using the method described in subrule (6) of this rule.
- (iii) Determine the total volume of coating solids used during the averaging period "V" by using the method described in subrule (7) of this rule.
- (iv) Determine the overall transfer efficiency "T" by using the method described in subrule (9) of this rule.
- (v) Determine the volume-weighted average weight of volatile organic compounds per gallon of applied coating solids " $P_e$ " by using the following equation:

$$P_e = \frac{M}{V \frac{(T)}{100}}$$

- (vi) If " $P_e$ " is less than or equal to the specified limit, the coating line meets the emission limit.
- (f) For coating lines that have 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per gallon of applied coating solids, use the following method:
- (i) Determine the volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category "P" used during the averaging period by using the method described in subrule (5) of this rule.
- (ii) Determine the weight of volatile organic compounds used during the averaging period "M" by using the method described in subrule (6) of this rule.
- (iii) Determine the total volume of coating solids used during the averaging period "V" by using the method described in subrule (7) of this rule.
- (iv) Determine the overall transfer efficiency "T" by using the method described in subrule (9) of this rule.
- (v) Determine the overall capture efficiency "N" by using the method described in subrule (10) of this rule.
- (vi) Determine the overall reduction efficiency " $R_T$ " by using the method described in subrule (11) of this rule.
- (vii) Determine the volume-weighted average weight of volatile organic compounds per gallon of applied coating solids " $P_f$ " by using the following equation:

$$P_f = \frac{M}{V \frac{(T)}{100}} (1 - R_T)$$

- (viii) If " $P_f$ " is less than or equal to the specified limit, the coating line meets the emission limit.
- (g) For graphic arts lines that do not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per pound of solids, as applied, use the following method:
- (i) Determine the volatile organic compound content of each ink and coating, minus water, as applied, "P," used during the averaging period by using the method described in subrule (5) of this rule.
- (ii) Determine the weight of volatile organic compounds used during the averaging period "M" by using the method described in subrule (6) of this rule.
- (iii) Determine the weight of ink and coating solids used during the averaging period "W" by using the method described in subrule (8) of this rule.
- (iv) Determine the average pounds of volatile organic compound per pound of solids, as applied, " $P_g$ ," by using the following equation:

$$P_g = \frac{M}{W}$$

- (v) If " $P_g$ " is less than or equal to the specified limit, the graphic arts line meets the emission limit.
- (h) For graphic arts lines that have 1 or more add-on emissions control devices for which emission limits are expressed in

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pounds of volatile organic compounds per pound of solids, as applied, use the following method:

- (i) Determine the volatile organic compound content of each ink and coating, minus water, as applied, "P," used during the averaging period by using the method described in subrule (5) of this rule.
- (ii) Determine the weight of volatile organic compounds used during the averaging period "M" by using the method described in subrule (6) of this rule.
- (iii) Determine the weight of ink and coating solids used during the averaging period "W" by using the method described in subrule (8) of this rule.
- (iv) Determine the overall capture efficiency "N" by using the method described in subrule (10) of this rule.
- (v) Determine the overall reduction efficiency "R<sub>T</sub>" by using the method described in subrule (11) of this rule.
- (vi) Determine the average pounds of volatile organic compound per pound of solids, as applied, "P<sub>h</sub>," by using the following equation:

$$P_h = \frac{M}{W} (1 - R_T)$$

- (vii) If "P<sub>h</sub>" is less than or equal to the specified limit, the graphic arts line meets the emission limit.

(i) For flatwood paneling coating lines that do not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compound per 1,000 square feet of coated finished product, use the following method:

- (i) Determine the volatile organic compound content of each coating, minus water, as applied that belongs to the same coating category "P" used during the averaging period by using the method described in subrule (5) of this rule.
- (ii) Determine the weight of volatile organic compounds used during the averaging period "M" by using the method described in subrule (6) of this rule.
- (iii) Determine the total surface area of coated finished product for the coating category during the averaging period "sq".
- (iv) Determine the volume-weighted average pounds of volatile organic compounds per 1,000 square feet of coated finished product "P<sub>i</sub>" by using the following equation:

$$P_i = \frac{\frac{M}{sq}}{1,000}$$

Where the units for the term 1,000 are square feet.

- (v) If "P<sub>i</sub>" is less than or equal to the specified limit, the coating line meets the emission limit.
- (j) For flatwood paneling coating lines that have 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per 1,000 square feet of coated finished product, use the following method:
  - (i) Determine the volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category "P" used during the averaging period by using the method described in subrule (5) of this rule.
  - (ii) Determine the weight of volatile organic compounds used during the specified averaging period "M" by using the method described in subrule (6) of this rule.
  - (iii) Determine the total surface area of coated finished product for the coating category during the averaging period "sq".
  - (iv) Determine the overall capture efficiency "N" by using the method described in subrule (10) of this rule.
  - (v) Determine the overall reduction efficiency "R<sub>T</sub>" by using the method described in subrule (11) of this rule.
  - (vi) Determine the volume-weighted average pounds of volatile organic compounds per 1,000 square feet of coated finished product "P<sub>j</sub>" by using the following equation:

$$P_j = \frac{\frac{M}{sq}}{1,000} (1 - R_T)$$

Where the units for the term 1,000 are square feet.

- (vii) If "P<sub>j</sub>" is less than or equal to the specified limit, the coating line meets the emission limit.

**R 336.2041 Recordkeeping requirements for coating lines and graphic arts lines.**

Rule 1041. (1) Unless otherwise specified in any of the following, the recordkeeping requirements specified in this rule shall apply to coating lines and graphic arts lines subject to emission limits contained in any of the following:

- (a) These rules.
- (b) A permit to install.
- (c) A permit to operate.

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- (d) A voluntary agreement.
  - (e) A performance contract.
  - (f) A stipulation.
  - (g) An order of the department.
  - (h) A renewable operating permit.
- (2) If a coating line does not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating, minus water, as applied, and if only 1 coating is used on the coating line during the averaging time, then a person shall keep records of the name, identification number, volume "L<sub>ci</sub>," and volatile organic compound content of the coating, minus water, as applied, "P," used during the averaging period, as described in R 336.2040(5). If this single coating used during an averaging period is in compliance with all of the emission limits specified in subrule (1) of this rule, then the volume "L<sub>ci</sub>" for the averaging period may be calculated, based upon coating usage records during a time period of not more than 1 month, with the coating usage prorated to the specified averaging period using a method approved by the department for that coating line.
- (3) If a coating line does not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating, minus water, as applied, and if more than 1 coating of the same coating category is used on the coating line during the averaging period, then a person shall keep all of the following records:
- (a) The name, identification number, volume "L<sub>ci</sub>," and volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category "P" used during the averaging period, as described in R 336.2040(5). If all coatings used on the coating line during an averaging period are in compliance with all of the emission limits specified in subrule (1) of this rule, then the volume "L<sub>ci</sub>" for the averaging period may be calculated, based upon coating usage records during a time period of not more than 1 month, with the coating usage prorated to the specified averaging period using a method approved by the department for that coating line.
  - (b) The weight of volatile organic compounds used during the averaging period "M," as described in R 336.2040(6).
  - (c) The total volume of coatings used on the coating line during the averaging period "G<sub>T</sub>," as described in R 336.2040(12).
  - (d) The volume-weighted average weight of volatile organic compounds per gallon, minus water, as applied, "P<sub>a</sub>," as described in R 336.2040(12).
- (4) If a coating line has 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating, minus water, as applied, then a person shall keep all of the following records:
- (a) The name, identification number, volume "L<sub>ci</sub>," and volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category "P" used during the averaging period, as described in R 336.2040(5).
  - (b) The weight of volatile organic compounds used during the averaging period "M," as described in R 336.2040(6).
  - (c) The total volume of coating solids and volume of ink or coating "L<sub>di</sub>" used during the averaging period "V," as described in R 336.2040(7).
  - (d) The overall capture efficiency "N," as described in R 336.2040(10).
  - (e) The overall reduction efficiency "R<sub>t</sub>," as described in R 336.2040(11), including the parameters "Q<sub>za</sub>," "C<sub>za</sub>," "Q<sub>im</sub>," "C<sub>im</sub>," and "M<sub>r</sub>."
  - (f) The volume-weighted average weight of volatile organic compounds per gallon of coating solids, as applied, "P<sub>b</sub>," as described in R 336.2040(12).
- (5) If a coating line does not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating solids, as applied, then a person shall keep all of the following records:
- (a) The name, identification number, volume "L<sub>ci</sub>," and volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category "P" used during the averaging period, as described in R 336.2040(5).
  - (b) The weight of volatile organic compounds used during the averaging period "M," as described in R 336.2040(6).
  - (c) The total volume of coating solids and volume of ink or coating "L<sub>di</sub>" used during the averaging period "V," as described in R 336.2040(7).
  - (d) The volume-weighted average weight of volatile organic compounds per gallon of coating solids, as applied, "P<sub>c</sub>," as described in R 336.2040(12).
- (6) If a coating line has 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per gallon of coating solids, as applied, then a person shall keep all of the following records:
- (a) The name, identification number, volume "L<sub>ci</sub>," and volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category "P" used during the averaging period, as described in R 336.2040(5).
  - (b) The weight of volatile organic compounds used during the averaging period "M," as described in R 336.2040(6).
  - (c) The total volume of coating solids and volume of ink or coating "L<sub>di</sub>" used during the averaging period "V," as described in R 336.2040(7).
  - (d) The overall capture efficiency "N," as described in R 336.2040(10).

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- (e) The overall reduction efficiency "R<sub>t</sub>," as described in R 336.2040(11), including the parameters "Q<sub>za</sub>," "C<sub>za</sub>," "Q<sub>im</sub>," "C<sub>im</sub>," and "M<sub>r</sub>."
- (f) The volume-weighted average weight of volatile organic compounds per gallon of coating solids, as applied, "P<sub>d</sub>," as described in R 336.2040(12).
- (7) If a coating line does not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per gallon of applied coating solids, then a person shall keep all of the following records:
  - (a) The name, identification number, volume "L<sub>ci</sub>," and volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category "p" used during the averaging period, as described in R 336.2040(5).
  - (b) The weight of volatile organic compounds used during the averaging period "M," as described in R 336.2040(6).
  - (c) The total volume of coating solids and volume of ink or coating "L<sub>di</sub>" used during the averaging period "V," as described in R 336.2040(7).
  - (d) The overall transfer efficiency "T," as described in R 336.2040(9), including "T<sub>i</sub>" and "U<sub>ci</sub>".
  - (e) The volume-weighted average weight of volatile organic compounds per gallon of applied coating solids "P<sub>e</sub>," as described in R 336.2040(12).
- (8) If a coating line has 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per gallon of applied coating solids, then a person shall keep all of the following records:
  - (a) The name, identification number, volume "L<sub>ci</sub>," and volatile organic compound content of each coating, minus water, as applied, that belongs to the same coating category "P" used during the averaging period, as described in R 336.2040(5).
  - (b) The weight of volatile organic compounds used during the averaging period "M," as described in R 336.2040(6).
  - (c) The total volume of coating solids and volume of ink or coating "L<sub>di</sub>" used during the averaging period "V," as described in R 336.2040(7).
  - (d) The overall transfer efficiency "T," as described in R 336.2040(9), including "T<sub>i</sub>" and "U<sub>ci</sub>".
  - (e) The overall capture efficiency "N," as described in R 336.2040(10).
  - (f) The overall reduction efficiency "R<sub>t</sub>," as described in R 336.2040(11), including the parameters "Q<sub>za</sub>," "C<sub>za</sub>," "Q<sub>im</sub>," "V<sub>im</sub>," and "M<sub>r</sub>."
  - (g) The volume-weighted average weight of volatile organic compounds per gallon of applied coating solids "P<sub>f</sub>," as described in R 336.2040(12).
- (9) If a graphic arts line does not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compounds per pound of solids, then a person shall keep all of the following records:
  - (a) The name, identification number, volume "L<sub>ci</sub>," and volatile organic compound content of each ink and coating, minus water, as applied, "P," used during the averaging period, as described in R 336.2040(5).
  - (b) The weight of volatile organic compounds used during the averaging period "M," as described in R 336.2040(6).
  - (c) The weight of ink and coating solids used during the averaging period "W," as described in R 336.2040(8), including "W<sub>ci</sub>" and "L<sub>di</sub>."
  - (d) The average pounds of volatile organic compound per pound of solids, as applied, "P<sub>g</sub>," as described in R 336.2040(12).
- (10) If a graphic arts line has 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per pound of solids, as applied, then a person shall keep all of the following records:
  - (a) The name, identification number, volume "L<sub>ci</sub>," and volatile organic compound content of each ink and coating, minus water, as applied, "P," used during the averaging period, as described in R 336.2040(5).
  - (b) The weight of volatile organic compounds used during the averaging period "M," as described in R 336.2040(6).
  - (c) The weight of ink and coating solids used during the averaging period "W," as described in R 336.2040(8), including "W<sub>ci</sub>" and "L<sub>di</sub>."
  - (d) The overall capture efficiency "N," as described in R 336.2040(10).
  - (e) The overall reduction efficiency "R<sub>t</sub>," as described in R 336.2040(11), including the parameters "Q<sub>za</sub>," "C<sub>za</sub>," "Q<sub>im</sub>," "C<sub>im</sub>," and "M<sub>r</sub>."
  - (f) The average pounds of volatile organic compound per pound of solids, as applied, "P<sub>h</sub>," as described in R 336.2040(12).
- (11) If a flatwood paneling coating line does not have an add-on emissions control device for which emission limits are expressed in pounds of volatile organic compound per 1,000 square feet of coated finished product, then a person shall keep all of the following records:
  - (a) The name, identification number, volume "L<sub>ci</sub>," and volatile organic compound content of each coating, minus water, as applied, "P," used during the averaging period, as described in R 336.2040(5).
  - (b) The weight of volatile organic compounds used during the averaging period "M," as described in R 336.2040(6).
  - (c) The total surface area of coated finished product for the coating category during the averaging period "sq," as described in R 336.2040(3).
  - (d) The volume-weighted average pounds of volatile organic compounds per 1,000 square feet of coated finished product "P<sub>i</sub>," as described in R 336.2040(12).



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(12) If a flatwood paneling coating line has 1 or more add-on emissions control devices for which emission limits are expressed in pounds of volatile organic compounds per 1,000 square feet of coated finished product, then a person shall keep all of the following records:

- (a) The name, identification number, volume " $L_{ci}$ ," and volatile organic compound content of each coating, minus water, as applied, " $P$ ," used during the averaging period, as described in R 336.2040(5).
- (b) The weight of volatile organic compounds used during the averaging period " $M$ ," as described in R 336.2040(6).
- (c) The total surface area of coated finished product for the coating category during the averaging period " $sq$ ," as described in R 336.2040(3).
- (d) The overall capture efficiency " $N$ ," as described in R 336.2040(10).
- (e) The overall reduction efficiency " $R_t$ ," as described in R 336.2040(11), including the parameters " $Q_{za}$ ," " $C_{za}$ ," " $Q_{im}$ ," " $C_{im}$ ," and " $M_r$ ."
- (f) The volume-weighted average pounds of volatile organic compounds per 1,000 square feet of coated finished product " $P_j$ ," as described in R 336.2040(12).

(13) An owner or operator of primer surfacer or topcoat operations subject to emission limits in R 336.1610(11), table 62, shall keep records as required in the publication entitled "Protocol for Determining the Daily Volatile Organic Compound Emission Rate of Automobile and Light-duty Truck Topcoat Operations," EPA-450/3-88-018, December, 1988, which is referenced in R 336.1610(6)(b).

(14) The records that are required in this rule shall be retained for a period of not less than 2 complete years from the date of collection and, upon request by the department, shall be submitted to the department in an acceptable format.

History: 1993 MR 4, Eff. Apr. 28, 1993; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2060 Procedures for determination of compliance with R 336.1631.**

Rule 1060. The following procedures shall be used for the determination of compliance with R 336.1631:

(a) The following procedure shall be used for the determination of compliance with R 336.1631 emission limitations expressed as pounds of volatile organic compound per 1,000 pounds of polystyrene resin, dry organic resin, or completed organic resin produced:

(i) Principle. Compliance with R 336.1631 is determined after determining all of the following:

- (A) The concentration of volatile organic compounds in the effluent gas vented to the atmosphere.
- (B) The flow rate of effluent gas vented to the atmosphere.
- (C) The pounds of polystyrene resin, completed organic resin, or dry organic resin produced over a period of time or per batch.
- (D) The length of time for each stage of the resin manufacturing operation.

(ii) Applicability. This procedure is applicable for the determination of compliance with R 336.1631 emission limits expressed as pounds of volatile organic compound per 1,000 pounds of polystyrene, completed organic, or dry organic resin produced.

(iii) All of the following provisions apply to procedure:

(A) The concentration of volatile organic compounds in the effluent gas vented to the atmosphere shall be determined using federal reference method 25, as described in R 336.2004, or an equivalent method approved by the department. A sample shall be taken from each vent emitting volatile organic compounds on all material recovery equipment and on all reactors, thinning tanks, and blending tanks. The samples shall be taken at a point between the last piece of control equipment on the vent and the vent opening to the atmosphere. Two samples shall be taken during each time period or stage in the manufacturing process represented by a process change. The results of the 2 samples shall be averaged.

(B) The flow rate of effluent gas vented to the atmosphere shall be determined using federal reference methods 1 and 2, as described in R 336.2004, or an equivalent method approved by the department. The flow rate shall be measured in conjunction with the sampling as required in subparagraph (A) of this paragraph. The flow chart shall be measured at a point between the last piece of control equipment on the vent and the vent opening to the atmosphere. The flow rates shall be measured on each vent stack of each piece of equipment affected by the emission limits referred to in this subdivision. Flow rates shall be measured on each piece of equipment from which the samples referred to in subparagraph (A) of this paragraph are taken.

(C) The pounds of polystyrene resin, completed organic resin, or dry organic resin produced shall be determined from plant production data.

(D) The length of time for each stage of a resin manufacturing operation shall be determined from plant records.

(iv) All of the following provisions apply to carrying out calculations:

(A) Nomenclature.

$C_{sv}$  = Concentration of volatile organic compound in the effluent gas flowing through stack  $v$  during stage  $s$  before venting to

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the atmosphere (pounds per cubic feet).

M = Total mass of volatile organic compound emitted through all stacks for every stage of the resin manufacturing operation per batch, or per calendar day for continuous processes (pounds of volatile organic compound).

K = Total mass of polystyrene resin, completed organic resin, or dry organic resin produced per batch or per calendar day for continuous processes (pounds of resin).

$Q_{sv}$  = Volumetric flow rate of the effluent gas flowing through stack v during stage s (cubic feet per minute).

R = Actual emission rate from a resin manufacturing process (pounds of volatile organic compound per 1,000 pounds of polystyrene resin, completed organic resin, or dry organic resin produced).

$T_s$  = Time period for each stage of the resin manufacturing process (minutes).

(B) The following equations shall be used:

(1) Calculate the total mass of volatile organic compound emitted from affected stacks for every stage of the resin manufacturing process using the following equation, where "a" is the total number of stages of the resin manufacturing process and "b" is the total number of stacks emitting volatile organic compound and involved in the manufacture of a resin affected by R 336.1631:

$$M = \sum_{s=1}^a \sum_{v=1}^b Q_{sv} C_{sv} T_s$$

(2) Calculate the actual emission rate from material recovery equipment used in the manufacture of polystyrene resin, and from reactors, thinning tanks, and blending tanks used in the manufacture of completed organic resin and dry organic resin, using the following equation:

$$R = \frac{(1000) M}{K}$$

If "R" is less than or equal to the required emission limit expressed as pounds of volatile organic compound per 1,000 pounds of polystyrene resin, completed organic resin, or dry organic resin produced for the affected resin operation, the resin operation meets the emission limit.

(b) The following procedure shall be used for the determination of compliance with the R 336.1631 emission limit requiring control equipment to reduce the total volatile organic compound emissions from reactors, thinning tanks, and blending tanks by 95 weight percent:

(i) Principle. Compliance with R 336.1631 is determined after determining all of the following:

(A) The concentration of volatile organic compounds in the effluent gas vented to the atmosphere.

(B) The concentration of volatile organic compounds in the effluent gas vented to the first piece of control equipment following the reactors, thinning tanks, or blending tanks.

(C) The flow rate of the effluent gas vented to the atmosphere and vented to the first piece of control equipment following the reactors, thinning tanks, or blending tanks.

(ii) Applicability. This procedure is applicable for the determination of compliance with the R 336.1631 emission limit requiring control equipment to reduce the total volatile organic compound emissions from reactors, thinning tanks, and blending tanks by 95 weight percent.

(iii) All of the following provisions apply to procedure:

(A) The concentration of volatile organic compounds in the effluent gas vented to the atmosphere shall be determined using federal reference method 25, as described in R 336.2004, or an equivalent method approved by the department. A sample shall be taken from each vent emitting volatile organic compounds on all reactors, thinning tanks, and blending tanks. The samples shall be taken at a point between the last piece of control equipment on the vent and the vent opening to the atmosphere. Two samples shall be taken during each time period or stage in the manufacturing process represented by a process change. The results of the 2 samples shall be averaged.

(B) The concentration of volatile organic compounds in the effluent gas vented from reactors, thinning tanks, and blending tanks shall be determined using federal reference method 25, as described in R 336.2004, or an equivalent method approved by the department. A sample shall be taken from each vent containing volatile organic compounds on all reactors, thinning tanks, and blending tanks. The samples shall be taken at a point on the vent immediately before entering the first piece of control equipment from the reactor, thinning tank, or blending tank. Two samples shall be taken at each time period or stage

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in the manufacturing process represented by a process change. The results of the 2 samples shall be averaged.

(C) The flow rate of the effluent gas vented to the atmosphere and vented from reactors, thinning tanks, and blending tanks shall be determined using federal reference methods 1 and 2, as described in R 336.2004, or an equivalent method approved by the department. The flow rate shall be measured in conjunction with the sampling as required in subparagraphs (A) and (B) of this paragraph. The flow rate shall be measured at a point between the last piece of control equipment on the vent and the vent opening to the atmosphere and also at a point between the reactor, thinning tank, or blending tank and the piece of control equipment nearest the reactor, thinning tank, or blending tank. The flow rates shall be measured on each piece of equipment from which the samples referred to in subparagraphs (A) and (B) of this paragraph are taken.

(iv) All of the following provisions apply to carrying out calculations:

(A) Nomenclature.

$C_{sv}$  = Concentration of volatile organic compound in the effluent gas flowing through stack v during stage s before venting to the atmosphere (pounds per cubic feet).

$C_{sv}^1$  = Concentration of volatile organic compound in the effluent gas leaving the reactor, thinning tank, or blending tank and flowing through stack v during stage s (pounds per cubic feet).

M = Total mass of volatile organic compound emitted to the atmosphere through the stacks of all reactors, thinning tanks, and blending tanks for every stage of the resin manufacturing operation (pounds of volatile organic compounds per minute).

$M^1$  = Total mass of volatile organic compound leaving all the reactors, thinning tanks, and blending tanks through the stacks for every stage of the resin manufacturing process (pounds of volatile organic compound per minute).

P = Actual weight percent of volatile organic compound emissions reduced by control equipment from all reactors, thinning tanks, and blending tanks (percent).

$Q_{sv}$  = Volumetric flow rate of the effluent gas flowing through stack v during stage s (cubic feet per minute).

$Q_{sv}^1$  = Volumetric flow rate of the effluent gas leaving the reactor, thinning tank, and blending tank and flowing through stack v during stage s (cubic feet per minute).

(B) The following equations shall be used:

(1) Calculate the total mass of volatile organic compound emitted from affected stacks for every stage of the resin manufacturing process using the following equation, where "a" is the total number of stages of the resin manufacturing process and "b" is the total number of stacks emitting volatile organic compound and involved in the manufacture of a resin affected by R 336.1631:

$$M = \sum_{s=1}^a \sum_{v=1}^b Q_{sv} C_{sv}$$

(2) Calculate the total mass of volatile organic compound leaving reactors, thinning tanks, and blending tanks through affected stacks for every stage of the resin manufacturing process using the following equation, where "a" is the total number of stages of the resin manufacturing process and "b" is the total number of stacks emitting volatile organic compound and involved in the manufacture of a resin affected by R 336.1631:

$$M^1 = \sum_{s=1}^{Aa} \sum_{v=1}^b Q_{sv}^1 C_{sv}^1$$

(3) Calculate the actual weight percent of volatile organic compound emissions reduced by control equipment from all reactors, thinning tanks, and blending tanks using the following equation:

$$P = \left( 1 - \frac{M}{M^1} \right) 100$$

If "P" is equal to or greater than 95, the resin operation meets the emission limit.

History: 1989 MR 4, Eff. Apr. 19, 1989; 2002 MR 5, Eff. Mar. 19, 2002.

**PART 11. CONTINUOUS EMISSION MONITORING**

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**R 336.2101 Continuous emission monitoring, fossil fuel-fired steam generators.**

Rule 1101. (1) Except as specified in R 336.2199, the owner or operator of any fossil fuel-fired steam generator that has an annual average capacity factor of more than 30%, as reported to the federal power commission for calendar year 1974, or as otherwise determined by the department, shall install, calibrate, maintain, and operate a continuous monitoring system for the measurement of all of the following:

- (a) Opacity, if the generator has more than 250,000,000 Btu's per hour heat input, unless gaseous fuel is the only fuel burned, or unless oil or a mixture of gas and oil are the only fuels burned and the source is able to comply with the applicable particulate matter and opacity standards without utilization of particulate matter collection equipment, and where the source has never been found from any administrative or judicial proceedings to be in violation of the applicable visible emission standard.
- (b) Sulfur dioxide, if the generator has a per hour heat input of more than 250,000,000 Btu's and if sulfur dioxide emission control equipment has been installed.
- (c) Nitrogen oxides if the generator has a per hour heat input of more than 1,000,000,000 Btu's, is subject to a nitrogen oxides emission standard, and is located in an air quality control region that has been determined by the administrator of the United States environmental protection agency to require a control strategy for nitrogen oxides, unless the owner or operator demonstrates, by source emission compliance tests, that the source emits nitrogen oxides at levels 30% or more below the applicable nitrogen oxide emission standard.
- (d) Oxygen or carbon dioxide percentage, if measurement of oxygen or carbon dioxide in the flue gas is required to convert either sulfur dioxide or nitrogen oxides continuous emission monitoring data to units of the applicable emission standard.
- (2) The owner or operator of any source subject to subrule (1) of this rule shall complete the installation and performance tests of the equipment required by subrule (1) of this rule and shall begin monitoring and recording within 18 months of the effective date of this rule.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2102**

**Source:** 1980 AACCS.

**R 336.2103**

**Source:** 1980 AACCS.

**R 336.2150 Performance specifications for continuous emission monitoring systems.**

Rule 1150. (1) The monitoring equipment required by R 336.2101, R 336.2102, and R 336.2103 shall be demonstrated by the owners or operators of the monitoring equipment to meet all of the following performance specifications:

- (a) Continuous monitoring systems for measuring opacity shall comply with performance specification 1 of appendix B to 40 C.F.R. part 60 (2000).
- (b) Continuous monitoring systems for measuring nitrogen oxides shall comply with performance specification 2 of appendix B to 40 C.F.R. part 60 (2000).
- (c) Continuous monitoring systems for measuring sulfur dioxide shall comply with performance specification 2 of appendix B to 40 C.F.R. part 60 (2000).
- (d) Continuous monitoring systems for measuring oxygen shall comply with performance specification 3 of appendix B to 40 C.F.R. part 60 (2000).
- (e) Continuous monitoring systems for measuring carbon dioxide shall comply with performance specification 3 of appendix B to 40 C.F.R. part 60 (2000).

(2) The performance specifications set forth in subrule (1) of this rule are adopted by reference. Copies of the performance specifications may be inspected at the Lansing office of the air quality division of the department of environmental quality. A copy of title 40 of the Code of Federal Regulations, part 60, appendix B, may be obtained from the Department of Environmental Quality, Air Quality Division, P.O. Box 30260, Lansing, Michigan 48909-7760, at a cost as of the time of adoption of this rule of \$66.00. A copy may also be obtained from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 371954, Pittsburgh, Pennsylvania 15250-7954, at a cost as of the time of adoption of this rule of \$66.00, or on the United States government printing office internet web site at <http://www.access.gpo.gov>.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1989 MR 4, Eff. Apr. 20, 1989; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2151**

**Source:** 1989 AACCS.

**R 336.2152**

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**Source:** 1980 AACs.

**R 336.2153**

**Source:** 1989 AACs.

**R 336.2154**

**Source:** 1980 AACs.

**R 336.2155 Monitor location for continuous emission monitoring systems.**

Rule 1155. (1) The owner or operator of a source subject to the provisions of this part shall install the required continuous monitoring systems or monitoring devices such that representative measurements of emissions or process parameters from the affected facility are obtained.

(2) When the effluents from 2 or more affected facilities of similar design and operating characteristics are combined before being released into the atmosphere, the owner or operator of a source subject to the provisions of this part may install monitoring systems on the combined effluent. When the affected facilities are not of similar design and operating characteristics, or when the effluent from 1 affected facility is released into the atmosphere through more than 1 point, the owner or operator shall establish alternate procedures to implement the intent of these requirements subject to approval by the department.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2159 Alternative continuous emission monitoring systems.**

Rule 1159. The department may provide approval for alternative monitoring systems that do not comply with the requirements of this part, if the owner or operator demonstrates both of the following:

(a) That an equivalent alternative emission monitoring system shall be implemented that satisfies the intent of the requirements of this part.

(b) That 1 of the following conditions exists:

(i) A continuous emission monitoring system that conforms with the requirements of this part will not provide an accurate determination of emissions.

(ii) The affected source is operated less than 1 month per year.

(iii) A continuous emission monitoring system that conforms with the requirements of this part cannot be installed due to physical limitations of the source.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2170 Monitoring data reporting and recordkeeping.**

Rule 1170. (1) The owner or operator of any continuous emission monitoring system required by this part shall submit to the department, within 30 days of the end of a calendar quarter, a written report for each calendar quarter which shall include all of the following information:

(a) Excess emissions and the nature and cause of the excess emissions, if known, as follows:

(i) For opacity measurements, the report shall consist of the magnitude, in actual percent opacity, of all 6-minute averages of opacity more than the applicable opacity standard for each hour of operation (all allowable exceptions are to be deducted before determining the excess averages of opacity). Average values shall be obtained by integration over the averaging period or by arithmetically averaging a minimum of 24 equally spaced, instantaneous opacity measurements per 6 minutes.

(ii) For gaseous measurements, the report shall consist of emission averages, in the units of the applicable standard, for each averaging period during which the applicable standard was exceeded.

(b) The date and time identifying each period during which the continuous monitoring system was inoperative, except for zero and span checks, and the nature of repairs or adjustments made.

(c) If the continuous monitoring system has not been inoperative, repaired, or adjusted, and if no excess emissions occurred, a statement attesting to this fact.

(2) The owner or operator of any continuous emission monitoring system required by this part shall maintain a file of all information reported in the quarterly reports and all other data collected, either by the continuous monitoring system or as necessary to convert monitoring data to the units of the applicable standard, for a minimum of 2 years from the date of collection of the data or submission of the reports.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2175 Data reduction procedures for fossil fuel-fired steam generators.**

Rule 1175. (1) The owner or operator of a fossil fuel-fired steam generator that is subject to the provisions of this part shall

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convert gaseous emission monitoring data in parts per million to pounds per million Btu's using either of the following procedures:

(a) When the owner or operator elects to measure oxygen in the flue gases, the measurements of the pollutant concentration and oxygen concentration shall each be on a consistent basis (wet or dry). When measurements are on a dry basis, the following conversion procedure shall be used:

$$E = CF \left( \frac{20.9}{20.9 - \% O_2} \right)$$

When measurements are on a wet basis, alternative procedures approved by the department shall be used.

(b) When the owner or operator elects to measure carbon dioxide in the flue gases, the measurements of the pollutant concentration and carbon dioxide concentration shall each be on a consistent basis (wet or dry) and the following conversion procedure shall be used:

$$E = CF_c \left( \frac{100}{\% CO_2} \right)$$

(2) The values used in the equations in subrule (1) of this rule shall be derived as follows:

(a) "E" is the pollutant emission in pounds per million Btu's.

(b) "C" is the pollutant concentration in pounds per dry standard cubic foot determined by multiplying the average concentration, in parts per million, for each hourly period by  $2.59 \times 10^{-9}$  M pounds per dry standard cubic foot per part per million where M is the pollutant molecular weight in pounds per pound mole (M equals 64.07 for sulfur dioxide and 46.01 for oxides of nitrogen).

(c) "% O<sub>2</sub>" or "% CO<sub>2</sub>" is the oxygen or carbon dioxide volume, expressed as percent, determined with equipment required by R 336.2101.

(d) "F" or "F<sub>c</sub>" is a factor representing a ratio of the volume of dry flue gases generated to the calorific value of the fuel combusted (F) or a factor representing a ratio of the volume of carbon dioxide generated to the calorific value of the fuel combusted (F<sub>c</sub>). Values of F and F<sub>c</sub> are listed in the standards of performance for new stationary sources, 40 C.F.R. §60.45(f) (2000).

History: 1979 ACS 1, Eff. Jan. 19, 1980; 1989 MR 4, Eff. Apr. 20, 1989; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2176**

**Source:** 1989 AACs.

**R 336.2189 Alternative data reporting or reduction procedures.**

Rule 1189. The department may provide approval for alternative data reporting or reduction procedures that do not comply with the requirements of this part if the owner or operator demonstrates, to the satisfaction of the department, that the procedures are at least as accurate as the procedures identified in this part.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2190 Monitoring system malfunctions.**

Rule 1190. The monitoring and reporting requirements of this part shall not apply during any period of monitoring system malfunction if the source owner or operator demonstrates both of the following to the satisfaction of the department:

(a) That the cause of the malfunction could not have been avoided by any course of action that could have reasonably been expected of the owner or operator.

(b) That the necessary repairs are being made as expeditiously as practicable.

History: 1979 ACS 1, Eff. Jan. 19, 1980; 2002 MR 5, Eff. Mar. 19, 2002.

**R 336.2199**

**Source:** 1997 AACs.

**PART 12. EMISSION AVERAGING AND EMISSION REDUCTION CREDIT TRADING**

**R 336.2201**

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**Source:** 1998-2000 AACS.

**R 336.2202**

**Source:** 1998-2000 AACS.

**R 336.2203**

**Source:** 1998-2000 AACS.

**R 336.2204**

**Source:** 1998-2000 AACS.

**R 336.2205**

**Source:** 1998-2000 AACS.

**R 336.2206**

**Source:** 1998-2000 AACS.

**R 336.2207**

**Source:** 1998-2000 AACS.

**R 336.2208**

**Source:** 1998-2000 AACS.

**R 336.2209**

**Source:** 1998-2000 AACS.

**R 336.2210**

**Source:** 1996 AACS.

**R 336.2211**

**Source:** 1998-2000 AACS.

**R 336.2212**

**Source:** 1998-2000 AACS.

**R 336.2213**

**Source:** 1998-2000 AACS.

**R 336.2214**

**Source:** 1998-2000 AACS.

**R 336.2215**

**Source:** 1998-2000 AACS.

**R 336.2216**

**Source:** 1998-2000 AACS.

**R 336.2217**

**Source:** 1998-2000 AACS.

**R 336.2218**

**Source:** 1998-2000 AACS.

**PART 13. AIR POLLUTION EPISODES**

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**R 336.2301**  
Source: 1997 AACS.

**R 336.2302**  
Source: 1997 AACS.

**R 336.2303**  
Source: 1997 AACS.

**R 336.2304**  
Source: 1997 AACS.

**R 336.2305**  
Source: 1997 AACS.

**R 336.2306**  
Source: 1997 AACS.

**R 336.2307**  
Source: 1997 AACS.

**R 336.2308**  
Source: 1997 AACS.

**PART 14. CLEAN CORPORATE CITIZEN PROGRAM**

**R 336.2401**  
Source: 1998-2000 AACS.

**R 336.2402**  
Source: 1998-2000 AACS.

**R 336.2403**  
Source: 1998-2000 AACS.

**R 336.2404**  
Source: 1998-2000 AACS.

**R 336.2405**  
Source: 1998-2000 AACS.

**R 336.2406**  
Source: 1998-2000 AACS.

**R 336.2407**  
Source: 1998-2000 AACS.

**R 336.2408**  
Source: 1998-2000 AACS.

**R 336.2409**  
Source: 1998-2000 AACS.

**R 336.2412**  
Source: 1998-2000 AACS.



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**R 336.2413**

Source: 1997 AACS.

**R 336.2414**

Source: 1997 AACS.

**R 336.2415**

Source: 1997 AACS.

**R 336.2420**

Source: 1998-2000 AACS.

**PART 16. ORGANIZATION, OPERATION, AND PROCEDURES**

**R 336.2601**

Source: 1997 AACS.

**R 336.2602**

Source: 1997 AACS.

**R 336.2603**

Source: 1997 AACS.

**R 336.2604**

Source: 1997 AACS.

**R 336.2605**

Source: 1997 AACS.

**R 336.2606**

Source: 1980 AACS.